OECD/CERT ICT PROGRAMME

A Case Study of ICT and Reform at School 3

June 26, 2001
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Overview

Description of School

School 3 started off as a co-ed school in 1955. In 1956, the boys were transferred to another school and it became a school for girls only. Under the guidance of eight lady Principals (including the present) the school has grown in terms of enrolment and academic performance. It is now one of the popular girls schools in Singapore. It is well known for its good academic performance, excellent track record of its Brass Band and Track and Field[1] performance.

The school has maintained its position as one of the top twenty schools in Singapore since 1996. This year, the school ranks[2] 17, enjoys the highest value-added[3] performance in L1B5 (First Language which is English and best 5 subjects) and has the best mean subject grade in the English Language in the school s history. The school s ranking for 1998 and 1999 cohort of pupils were 17th and 20th respectively.

In 1996 School 3 became autonomous[4] joining 15 other Singapore Schools, which are selected based on good academic and co-curricular performance of the pupils, the effective programmes implemented in the school and good leadership.

Student Profile

The student enrolment now stands at 1415, distributed across 9 classes per level, and all pursuing the Express Course[5]. The Primary School Leaving Examination cut-off point for this year s cohort of pupils for this school was 236 with the mean aggregate score at 244. This is considered high compared to the score of 190, attained by the average pupil who sits for the same exam. 47% of the pupils reside in 4-5 room HDB flats, which are normally owned by the middle and higher income families. In an Internet Survey conducted by Nanyang Technological University last year, out of a sample size of 72 Sec 2 pupils (30% of Sec 2 pupils), 100% of them have a computer at home and 97% are Internet users at home. In general, the pupils of this school are above average in ability, and they come from middle and higher income families.

ICT in School 3

In 1996, the school was selected by the Ministry of Education (MOE) to participate in the STW (Student Teachers Workbench) a pilot project which involved the lower secondary pupils. The STW is a collection of digital science resources created by selected science teachers from various schools for science lessons. Teachers were required to draw upon the digital resources and develop lessons for instruction. The project was completed in 1998. At the same time, in 1997, School 3 was identified as one of 10 phase 1 schools to implement Singapore s Masterplan for IT in Education (MPITE).

The school has since established a name for itself as a school with good ICT programmes, such as a compulsory 30-hour computer education programme, known as the Lower Secondary Computer Education Programme (LSCEP), to equip the lower secondary pupils with basic ICT skills. The school also uses ICT in collaborative projects with external agencies, like local hospitals and charitable organisations. School 3 started off by using the existing resources like CD-ROMS for teaching and learning. Under the guidance of

the present Principal and IT committee, the use of ICT has been extended for communication, e-counselling, administration, collaborative projects and as a media repository for sharing.

Since 1998, the use of ICT has evolved and taken a new form called ***S3Sphere***, a virtual learning platform put in place to support the various uses planned by the school[6]. ***S3Sphere*** is a one-stop platform for all ICT programmes planned by the school. In other words in School 3, ***S3Sphere*** is considered equivalent to ICT.

With regards to infrastructure, the school has about 8 computer labs. This is considered high as the norm for the average school is 2 computer labs and one ICT Learning Resource Room (source of information: Media and Infrastructure Support Branch, MOE). Besides this, every classroom and special room is equipped with LCD projector. Every teacher has a notebook and a LAN point at his/her workstation.

Reform in School 3l

The focus of our study is on communication with all stakeholders of School 3 using the intranet system called ***S3Sphere.*** The school seeks to develop an effective communication channel so as to build a community within and outside the school, and at the same time develop a caring and service-oriented culture using ICT to support the development of the pupils affective domain. The setting up of ***S3Sphere*** has enhanced communication and learning within the school as it greatly facilitates communication processes, counselling, collaborative projects with the community, resource building and sharing.

Based on the Principal s view that the school recognises that the pursuit of ICT should be balanced by the development of the human spirit and character (9 Nov 2000), this study will also provide a better insight of how the school has harnessed ICT, or ***S3Sphere***, to develop a caring and service-oriented culture to support the development of the pupils affective domain and at the same time enhance teamwork, leadership, entrepreneurial and independent learning skills.

The Past

History of ICT/Reform

In line with new initiatives introduced by the Ministry of Education, School 3 initiated Interdisciplinary Project Work (IPW) for all its lower secondary pupils in 1998. As each project involved a number of teachers from different disciplines, finding a common time for teams of teachers and groups of pupils to meet for consultation was a problem. The teachers in each team had to wait to take turns to assess their pupils projects when the assessment was done offline on average about three days, before another teacher gets the chance to assess the pupils project . (Teacher 3, 13 Feb 2001). A related problem faced by the teachers in each team was getting timely feedback from their colleagues on pupils work so that assessing the project could be done promptly.

To solve these problems in the implementation of project work, the school initiated a virtual learning environment project called ***S3Sphere*** in 1999. Pupils could submit and store their web-based interdisciplinary projects on ***S3Sphere***. Teachers of different disciplines could provide on-line consultation and assessment with pupils individually (through email) or collectively, without being constrained by time and place. Admin 3 and the teachers interviewed noted that any teacher assessing that class or responsible for that class ....can actually log on at any time to look at it, to give feedback....another teacher at the same time can also look at it, to give feedback... . (Admin 3, 15 Nov 2000).

Within a year, the school decided to harness the use of ICT, facilitated by ***S3Sphere***, in other areas besides IPW. The Principal, HOD/IT and teachers wanted not only to use and integrate ICT in their teaching and learning but also go beyond and use it to communicate with teachers, pupils, parents and members of community, using ***S3Sphere*** platform . (Admin 3, 15 Nov 2000). Teachers 1, 2 and 3 shared that we are looking at holistic view...focus is in building up a caring culture and in a sense service oriented culture . (Teacher 1, 13 Feb 2001). Admin 2 wanted to create opportunities for ... pupils to use ICT skills to be involved in the community, to help in the community in whatever way they can (9 Nov 2000).

The former Principal and Head of IT Department (HOD/IT) spearheaded the use of technology for teaching and learning in School 3. The present Principal, who took over in December 1998, continued the programme. A new staff took over the post of HOD/IT in 1998. Both the Principal and HOD/IT together with the IT committee were responsible for the conceptualisation of ***S3Sphere***. The teachers who were interviewed noted that a group of people comprising ... the P, VP, HOD/IT... and Knowledge Village [a private company involved in the design and development of ***S3Sphere***] were instrumental in the implementation of ***S3Sphere*** . (Teacher 1, 13 Feb 2001).

Adoption of ICT/Reform

Admin 1 and Admin 2 noted that teachers who readily accepted the move towards ICT for learning and teaching were teachers who are positive; the ones who want to try new things to improve their art of teaching . (Admin 2, 9 Nov 2000). Admin 2 and Admin 3 remarked that Mother Tongue[7] teachers were slower in adopting ICT because most of the training was provided in English . (Admin 2, 9 Nov 2000).

In 1999, the school selected a small group of teachers to help pupils use ***S3Sphere*** to carry out collaborative projects to help the underprivileged in the community. The Principal, Vice-principal and HOD/IT who made up the selection committee selected teachers who are IT savvy and at the same time have EQ . (Admin 3, 15 Nov 2000). Admin 2 said as they are interacting with other charitable organisations, they must be teachers who have a big heart for the intellectually disabled . (9 Nov 2000).

Likewise, the school selected the Head of PCCG (Pastoral Care and Career Guidance) Committee, together with two other teachers from the team, to be involved in e-counselling. The number of pupils who came onboard to seek advice using the ***S3Sphere*** platform is also very small about 50 pupils. Since the beginning of the service, to date the school has about 150 entries on ***S3Help***, some of which come from the same pupils.

Barriers to Implementation

It was not easy for the teachers in the school to switch to the use of technology in teaching, counselling, collaborative projects and community service. Teachers 1, 2, 3 and Admin 2 agreed that time constraint was a big obstacle (Admin 3, 15 Nov 2000) as the implementation of the ICT programme learning new skills like using MSOffice programme and preparing IT-based lessons, was on top of the teachers usual work load. The teachers also needed reassurance as pointed out by Admin 2 and Admin 3: the teachers needed to be sure that the effort that is spent learning and teaching with computers is worthwhile . (Admin 2, 9 Nov 2000). Upper secondary teachers were more concerned about curriculum time being put to good use, which meant preparing their pupils for examinations. As Admin 3, pointed out there was a struggle for time, I mean everybody has 24 hours only . (15 Nov 2000). Furthermore, the teachers needed a lot of help like using MsWord, Powerpoint, email, Internet and basic troubleshooting skills during the initial period of implementation. The school had problem supporting the teachers because of the rapid change in

Technology Assistants (TAs); about 5 or 6 changes of TAs within a year.

As far as collaborative projects with the community are concerned, the number of teachers involved is very small. They were handpicked. As such it was not a problem to implement this programme effectively.

Solutions to overcome the barriers

As School 3 is an autonomous school, the Principal was able to employ an additional Audio Visual support staff to help the teachers. The Principal solved the problem of TAs by employing an additional TA. In addition there are 2 IT monitors in every class. Admin 2 and Admin 3 shared that They [the IT monitors] have been given specialised training in terms of the hardware so that in case there is a problem in the class during a lesson, they will be able to help the teacher . (Admin 3, 15 Nov 2000).

The Principal together with her ICT committee helped in the staff development when they divided the teachers into two groups (Admin 2, 9 Nov 2000) - fast track group who can take on, more things and the slower group which is given more individualised attention . For individualised training, besides the trainer being present, the ICT committee members are also on hand to help the teachers. The school has `basic, intermediate and advanced ICT training throughout the year to enable the teachers to keep up (notes from interview on 9 Nov 2000 & 15 Nov 2000).

As to the issue of time factor and reassurance for teachers Admin 2 said we try to prioritise and help them in terms of other kinds of support that we could give (9 Nov 2000). Teachers are given the leeway to take one step at a time and ICT committee members are always there to help the teachers who require assistance, as pointed out by Admin 3: he or she from the IT committee, actually handhold the so-called not-so comfortable teachers so in this case they played a very important role . (15 Nov 2000).

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The Present

ICT and Reform

Since 1999, ***S3Sphere*** has become an integral part of School 3. ***S3Sphere*** uses a customised software known as First Class Collaborative Classroom (FCCC). **S3Sphere** is an intranet, web-based platform which supports communication amongst teachers and pupils through its email, discussion forum, bulletin board and video conferencing features. It is also functions as a media repository and serves as a convenient platform for collaborative projects with the community at large.

S3Sphere as a digital media repository promotes sharing amongst teachers and pupils. It stores the customised resources developed by the staff and pupils in School 3. All school personnel who were interviewed shared that all forms, circulars and information have been digitised and placed in shared folders in ***S3Sphere*** . (Teacher 3, 13 Feb 2001). Therefore, the teachers are expected to log on everyday, to get information from management.

S3Sphere is used to book special rooms, as an electronic messaging system, to track pupils attendance, as a calendaring system of school activities and for archiving of documents e.g. event photographs, important presentations. Teachers 1, 2, and 3 commented that we don t have to go through this process of running to book or get the keys to open. We book online and just flash the smart card and enter the room. The

calendering system in ***S3Sphere*** has all activities we have got indicated; so parents are able to look at it and know what is happening in the school . (Teacher 2, 13 Feb 2001).

S3Sphere is also used to support the school s mission of `developing caring and gracious citizens of the world . The school has involved the pupils in collaborative projects with local hospitals like Mount Alvernia Hospital and National University Hospital on the themes of Osteoporosis and Leukaemia in Children respectively. This project involved live conferencing, using ***S3Sphere,*** with the medical personnel from both hospitals. Pupils were invited to ask these medical personnel questions during operations.

In 1999, the entire cohort of Secondary 3 pupils promoted awareness and recognition for the members of the Singapore Special Olympics Team, which participated in the World Games, held in North Carolina, USA. The pupils, who trained with the athletes, got to know them personally, wrote about athletes aspirations and set up a web-site (http://www.soar.org;/) to publicise the event.

In the year 2000, an e-commerce project known as The Very Special Bazaar (VSB) was set up to enrich pupils learning. The school adopted Peacehaven (Home for the Elderly) in 1998. Since then the girls have been visiting the old folks on a weekly basis, selling flags to raise funds for the home and inviting the old folks to attend school functions. The realisation that ICT is an effective tool which would allow the school to reach out to a larger community sparked off the VSB project. A core group of 15 secondary 3 pupils worked collaboratively with members of Peacehaven (Home for the Elderly), MINDS and The Very Special Arts Singapore to put up crafts and art pieces for sale via an e-commerce engine (www.veryspecialbazaar.org). The proceeds from the sale went to the elderly and the physically and intellectually challenged in these organisations.

In 2000, e-counselling service for pupils who may be shy to speak face-to-face to teachers about their personal problems was rolled out. Admin 3 and the teachers involved shared that school started ***S3Help***, the e-counselling service so that pupils who face, let s say some personal problems, and are not comfortable talking to their teacher, can use ***S3Sphere***.. we have got teachers and pupils who have faced the same problems answering the questions . (Admin3, 15 Nov 2000). When it comes to e-counselling, pupils still have the option of meeting up face-to-face with teacher-counsellors. Not all pupils with problems want to be faceless as they do meet the teachers everyday, communicate with them and sometimes are counselled on the spot when the need arises. As teacher 3 pointed out ..we must remember, we cannot use ICT for all...must also use traditional way . (13 Feb 2001).

The Impact of ICT/*S3Sphere* on Teaching and Learning

Pupils are more motivated and participate actively when ICT is used for teaching and learning. Teacher 3 remarked within the group the good pupils help the weaker ones; they do more independent learning and more research work on their own . (13 Feb 2001). Teachers 1 and 2 pointed out the fact that the girls do things beyond the curriculum . (Teacher 1, 13 Feb 2001). Pupil 2 pointed out we go online to get more ideas and information for Physics projects. Some of the information are beyond of our syllabus and is something we can relate to, in real life . (16 Feb 2001). The pupils who were involved in video conferencing project said, there is a interest generated on it and is something outside the syllabus and is something we can relate to in real life . (16 Feb 2001). This move to expose pupils to real life situations has broadened the pupils perspective and made the class borderless.

Teachers 1, 2 and 3 commented that pupils interdisciplinary projects using ICT are neater, more presentable and informative . (Teacher 3, 13 Feb 2001). They also found that their presentations, which are

developed using ICT, are well received by the pupils as the pupils find these presentations clearer, easier to follow and interesting (Pupil 6, 16 Feb 2001).

S3Sphere s on-line media repository provides a useful reference for both pupils and teachers. Teacher 3 said, `I put good materials in FCCC and then send to all those who are working with me. When I go to the computer room, all I need to do is to click..... . (13 Feb 2001). Student 6 said the FCCC is the place where different classes have their folders; we put our stuff there, draw it out when necessary for our use and for sharing with others . (16 Feb 2001).

The implementation of ICT has also brought about some negative impacts.. As all the teachers interviewed remarked, there are pupils who spend hours chatting, ... and playing games . (Teacher 3, 13 Feb 2001). This negative impact, though, is under control in the school, as the pupils are not allowed to play and chat in the school. Another negative impact, which affected the teachers, is that some of them spend hours and hours looking for a good piece of resource . (Teacher 3, 13 Feb 2001). Teacher 2 said it is time consuming to prepare a lesson using ICT . (13 Feb 2001).

The Impact of Reform on Communication/Community Building

The teachers found *S3Sphere* to be a very effective platform to promote communication within and outside school. As all the teachers interviewed pointed out it is so widely used that staff have to check the FCCC for daily notices; no longer do we have to put or write our messages and put [the messages] in a pigeon hole (13 Feb 2001). Teacher 1 said we don t see our pupils everyday because depending on when we go into the class; ...[but we] can leave messages using FCCC . (13 Feb 2001).

Presently parents are able to keep up with the general information of school 3 via the school s web page. The school is now planning to send out messages to parents soon; ..have what is called list serve; basically parents can know more about CCA [Co-curricula Activities] of their children (Teacher 2, 13 Feb 2001). This will further improve the communication between the school and home.

S3Sphere makes E-learning possible as it allows staff and pupils to communicate and work on their assignments without the constraints of time and place. It allows pupils to reach their teachers easily for consultation on their project work as well as facilitates pupil and staff interaction beyond the classroom. As the pupils who were interviewed commented, questions on assignments that we do not understand, we can just ask easily via email . (Pupil 5, 16 Feb 2001).

The number of pupils who are involved in collaborative projects with the community is small (about 20 to 30 pupils). Each year, the project involves different charitable organisations/ institutions, and the support from pupils is always there. It is on a voluntary basis that the pupils get involved in these collaborative projects.

Pupils who were involved in these projects had opportunities to work with the less fortunate. These pupils not only acquired skills like web page design but also positive qualities along the way. They learnt to be more appreciative of what they have and picked up qualities such as perseverance, determination and patience. Pupils 5 said, they don t have a normal life like us; yet they can live so happily. Why can t we? . (16 Feb 2001). He/she also said I have learned to be more patient and not to take things for granted . (16 Feb 2001). Pupils 3 shared that We have to have a lot of determination and commitment to what [we] have to do . (16 Feb 2001). Pupil 6 said it is not about attaining glory but more about helping society, giving back what we have .. . (16 Feb 2001). From these comments, it seems like the school is on its way in its effort to develop caring and service-oriented pupils.

S3Sphere is used for communication with all stakeholders of the school. All circulars and messages are communicated via email. In the process, it has helped the teachers to use ICT even without them realising it, to the extent that ICT has become part and parcel of School 3 s life. The staff has reached a stage whereby they feel that life in School 3 cannot be the same without ***S3Sphere***. (notes from interviews, 9 Nov 2000, 15 Nov 2000 & 13 Feb 2001).

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.

There is evidence that technology was a strong catalyst for generating and improving communication amongst all stakeholders of School 3 and in the process helped the school to link with the community and the world at large.

Technology, in the case of School 3, is the virtual learning platform called ***S3Sphere*** which is used to facilitate communication within and out of school, acts as a repository for easy retrieval of information for instruction, pupil and teacher profile, helps to carry out administrative tasks, and acts as a platform to host collaborative projects.

As identified earlier in this report, the school s objective to develop an effective communication channel would not have been possible without ***S3Sphere***. It was only after putting the ***S3Sphere*** in place that School 3 started circulating messages and circulars via email. Admin 2, 3 and all the teachers testified to the extensive use of ICT for communication: I can safely say that 100% of School 3 teachers, use ICT for communication . (Admin 2, 15 Nov 2001).

S3Sphere also enhanced the communication between pupils and teachers. Unlike the situation before technology was used, teachers and pupils can now communicate and work on their assignments without the constraints of time and place. S3Sphere allows pupils to reach their teachers early for consultation in their project work. It also led to more pupil and teacher interaction beyond the classroom. For example, although only a small number of pupils is currently involved, e-counseling may have encouraged pupils who normally would not have shared their problems with teachers to talk about their problems, given the anonymity provided by technology.

In addition, S3Sphere enabled the school to enhance its existing relationships with the community beyond the school. The Principal cited that it was during a brainstorming session that the idea of using ICT to cement an even stronger relationship with Peace Haven was hatched. (9 Nov 2000). The ICT committee also realised that ICT as a communication tool, is able to reach out to a much wider audience . (Admin 2, 9 Nov 2000). For example, ***S3Sphere*** is used to create/post web pages to publicise charitable

organisations/institutions so as to create a greater awareness in the community. Unlike the usual way of raising funds for charity by selling art and crafts pieces face to face, when it was sold on-line supported by ***S3Sphere***, the pupils were able to reach a wider group of people.

Thus, technology acted as a strong catalyst for the development of an effective communication channel for the stakeholders of School 3.

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.

The diffusion of the reform followed the traditional diffusion pattern for innovation, as outlined by Rogers (1995).

The innovators of the reform in this case were the leaders, namely the Principal and HOD/IT. The HOD/IT was described as a person who has very innovative ideas (Admin 2, 9 Nov 2000). The leaders saw the innovation as a means to equip their pupils with the latest ICT skills so that they are able to meet the latest challenges ahead when they enter into society . (Admin 2, 9 Nov 2000) and they can produce the kind of resource which is in high demand for high tech industry (Admin 1, 21 Dec 2000).

According to Admin 2 and 3, the early teacher adopters were self-motivated teachers who wanted to try new things in order to improve their art of teaching . (Admin 3, 15 Nov 2000). These teachers have a big passion for teaching and they take a lot of pride in the things that they do , according to Admin 2. (9 Nov 2000).

Admin 2, 3 and Teacher 1 also noted that the early adopters are teachers who have some ICT skills. According to them, the younger teachers and teachers who are more competent in ICT and recognise the worth of using ICT are the ones who moved faster in the ICT track. This was mentioned by Teachers 1 and 2 who commented that the teachers recognise the need to move forward towards the usage of ICT because they know that change is inevitable and that ICT can enhance their teaching . (Teacher 3, 13 Feb 2001). Admin 2 also mentioned that because of that, these teachers embrace it (ICT) whole-heartedly . (9 Nov 2000).

There was no open resistance to the reform. However, according to Admin 2 and 3, and Teachers 1 and 2, there was a group of teachers that could be considered as late adopters. They are known as the jalan-jalan[8] teachers. (Admin 2, 9 Nov 2000). These are teachers who were slow in grasping ICT skills, and as Admin 2 indicated, they are slower in catching on with the technical things (9 Nov 2000). These refer mainly to older and more senior teachers who may not be as comfortable as the younger teachers (Admin 3, 15 Nov 2000) in using technology and older teachers who are fearful . (Teacher 3, 13 Feb 2001). Thus, they were given more time and technical supports to help them adopt the reform.

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.

The focus of our case study is not on the integration of ICT into instruction and learning but the use of ICT for communication purpose, although that communication is sometimes within the context of project work.

In School 3, it is more evident that the infrastructure that was put in place facilitated the implementation of the reform. Being in phase 1 of the implementation of the MasterPlan for IT in Education, Admin 1, 2 and 3, and all the teachers interviewed pointed out that the school has been fully equipped in the latest technology as well as facilities wise . (Admin 2, 15 Nov 2000). The school has eight computer labs and classrooms equipped with LAN points and projectors as well as a Cyber Café; a free access area where pupils can go anytime. Apart from that, every teacher s workstation is equipped with a LAN point and every teacher has a notebook. This makes it convenient for the teachers to access the ICT resources and carry out various tasks involving ICT, involving communicating with ICT, as pointed out by Admin 2 (15 Nov 2000), and Teachers 1 and 3 (13 Feb 2001).
The extensive infrastructure facilitated the use of ICT for communication purpose. Refer to hypothesis 1 for illustrations of how ICT has enhanced communication amongst various stakeholders of the school.

Staff and student ICT competence are not an issue since the system is very user-friendly and does not require the user to have a high level of ICT competence to manage or handle.

Hence, in the case of School 3, the technological infrastructure rather than staff or pupils ICT competence determines the successful implementation of ICT for communication and community building.

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.

The pupils in School 3 are generally above average and considered high in ability. Thus, the gap in academic performance is hardly noticeable in the first place. There is also little evidence to ascertain that equal access to ICT will lead to high ability pupils increasing the performance gap with the low ability students or vice versa.

However, Admin 2 (9 Nov 2000) and Teacher 3 (13 Feb 2001) mentioned that the more academically inclined pupils usually helped the less able pupils when they were working on their projects. This was observed during a lesson conducted by Teacher 3. (16 Feb 2001). Nevertheless, this phenomenon may be due to the nature of project work, rather than due to the use of ICT.

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.

There is no evidence to suggest that the above hypothesis is true. Nor is there any evidence to suggest ICT use will lead to a lowering of academic standards.

However, according to Admin 1 (21 Dec 2000), the teachers (13 Feb 2001) and pupils (16 Feb 2001) interviewed, ICT has made learning more interesting and challenging for the pupils. They are transported virtually to see real life experiences , according to Teacher 1 (13 Feb 2001). Admin 1 and Teachers 1 and 3 noted that Technology is used to reach beyond the classroom . (Teacher 1, 13 Feb 2001).

In addition, Admin 2 (9 Nov 2000) felt that the pupils are enriched by the processes involved in carrying out projects involving the use of ICT for example surfing the Internet, gathering information and presenting their findings. Teacher 3 (13 Feb 2001) also mentioned that the pupils do more independent learning and more research work on their own . To say that the use of ICT has maintained or improved pupils academic performance in School 3, one has to assume that the learning processes relate positively to academic performance. In this case, however, there is no statistical evidence (test scores, exam marks) to show that, there is such a relationship. Hence it cannot be proven that the use of ICT has lead to the same, higher or even lower academic standards.

Projection to the Future

Today, ICT is an integral part of the school. Admin 2 and all the teachers and pupils interviewed felt that they could not function without ICT in the school. Most of the administrative work is done using ***S3Sphere***.

Professional development is a key element in this school s change and innovations. Training is tailored to the needs of the teachers and provided at different times as and when necessary. The provision of two TAs, support from the vendors and selected people within the various departments have helped the teachers in their planning of ICT-based lessons. The customised training, refresher courses and a variety of other ICT courses and sharing, have helped the staff s professional development.

Admin 2 and 3 (9 Nov 2000, 15 Nov 2000), and Teacher 1 (13 Feb 2001) indicated that the school has many future plans to make more effective use of ICT, both for teaching and learning, and for communication. For example, the school is going to come up with a classroom of tomorrow, fully equipped with new and sophisticated technologies (Admin 2, 9 Nov 2000). In addition, the school plans to use new technologies for communication purpose, such as an electronic messaging system.

The school would also like to continue to promote a sharing culture amongst the staff, and is planning to expand ICT beyond the school and Singapore . (Admin 2, 9 Nov 2000). The IT committee is thus working towards creating a virtual school . (Admin 2, 9 Nov 2000). The school has interested partners in other countries who will be working with the school . (Admin 2, 9 Nov 2000).
With regards to collaborative projects with the community. Teachers 1 and 3 (15 Feb 2001) and all the pupils (16 Feb 2001) interviewed mentioned that more collaborative projects are in line to help the less fortunate in society. According to Admin 2 (9 Nov 2000), Admin 3 (15 Nov 2000) and all the pupils (16 Feb 2001) interviewed, the school will be working with The School for the Deaf on a new project in 2001. School 3 has a history of working with different charitable organizations, and this tradition is likely to

continue, including the use of ICT to enhance the relationship.

According to Admin 1 (21 Dec 2000) and Teachers 1 and 2 (13 Feb 2001), the Principal and HODs play an instrumental role in bringing about the changes and innovations in the school. They set the direction by sharing their vision with teachers, planning ahead, and providing both technical support and customised, on-time training. Such leaders, with vision and foresight, are the key elements that would help to sustain any of the school programme, including the ICT programme or move it to a greater height.

With regards to the transferability of School 3 s reform to other schools, the school has conducted a sharing session on the reform with other schools within the cluster (Admin 1, 21 Dec 2000). Two of the school have modified the ideas and come up with their own version of the reform for their schools.

Appendix A

Research Team

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Lim Li Kiang	
Willy Tan	

Period of Study

Contact Period	Date(s)
First contact	5 Oct 2000
Data collection period	5 Oct 2000 16 Feb 2001
Follow-up contact (e.g. verification of data)	4 Jan 2001 6 April 2001

Summary of Data Collected

Type & Quantity of Data	Average time spent	People involved
4 interviews	2 hours per interview	1 teacher and 3 Administrator
2 focused group discussions	2 hours	2 teachers and 6 pupils
1 Classroom Observation	1 hour	2 teachers and 80 pupils
School s IT programme	1 hour reading	N.A.
School s web site	1 hour reading	N.A.

Legend of Data Sources

Admin 1	Cluster Superintendent

Admin 2	The Principal
Admin 3	The Head of the IT Department
Teacher 1 and 2	Teachers who are closely involved in the reform
Teacher 3	A teacher who is not involved in the reform
Pupil 1 Pupil 6	Pupils who are closely involved in the reform

Appendix B

OECD/CERI ICT PROGRAMME

ICT Practices Survey for Teachers at School 2 (Figures in Percentages)

Number of staff members surveyed: 61

Percentage of total staff: 40%

A	**How comfortable are you with using a computer to do each of the following?**				
Ratings: 1 - Very Comfortable 2 - Comfortable 3 - Somewhat comfortable 4 - Not at all comfortable					
		1 %	2 %	3 %	4 %
1	write a paper	55	31	8	2
2	search for information on the World Wide Web (WWW)	43	41	11	5
3	create and maintain web pages	3	13	45	38
4	use a data base	7	32	39	22
5	develop a data base	7	15	30	48
6	send and receive e-mail	62	28	8	2
7	write a program	1	14	17	68
8	draw a picture or diagram	11	25	37	27
9	present information (e.g., use PowerPoint or equivalent)	36	31	23	10

B	**How important is each of the following computer-related skills for your teaching?**				
Ratings: 1 - Very Comfortable 2 - Comfortable 3 - Somewhat comfortable 4 - Not at all comfortable					
		1 %	2 %	3 %	4 %
10	write a paper with a word processor	38	48	12	2
11	search for information on the WWW	27	50	23	0
12	create Web pages	3	20	50	27
13	use a data base	5	45	37	13
14	develop a data base	4	23	50	23
15	send and receive e-mail	25	38	32	5
16	write a program	3	12	43	42
17	draw a picture or diagram with a graphing/drawing application	15	34	29	22
18	present information (e.g., use PowerPoint or equivalent)	28	38	32	2

C	During the past school year, how often did your students on average do the following for the work you assigned?
Ratings: 1 - Very Comfortable 2 - Comfortable 3 - Somewhat comfortable 4 - Not at all comfortable	

		1 %	2 %	3 %	4 %
19	use the World Wide Web	5	38	48	13
20	create web pages	3	22	20	55
21	send or receive e-mail	15	28	32	25
22	use a word processing program	14	34	42	10
23	use a computer to play games	7	8	24	61
24	use a spreadsheet	0	6	17	77
25	use a graphics program	0	18	35	47
26	join in an on-line forum or chat room	2	8	27	63
27	use a presentation program (e.g., PowerPoint)	0	30	40	30
28	use an instructional program (including simulations)	0	17	33	50
29	other computer uses (please specify)	0	7	28	65

			Good %	Fair %	Poor %
30	How would you rate your ability to use a computer?		39	58	3

Answer questions 31 - 38 based on experiences or policies from the last school year.

				Yes %	No %
31	Was student computer use ever evaluated for grading?			52	48
32	Did you create or modify a Web site with any of the classes that you taught?			20	80
33	Did you participate as a student or instructor in a virtual course through the Internet/World Wide Web?			33	67
34	Did you involve your students in collaborative learning over the Internet/World Wide Web with students from other classes?			10	90
		All %	Most %	Some %	Little %
35	What portion of the computer use in your classes was directly related to the course content?	13	20	44	23
36	What portion of the computer use that you assigned was done by students individually?	5	19	49	27

		no restrictions %	some restrictions %	designated sites only %
37	If you assigned World Wide Web searching, how much freedom did you allow students in locating sites to visit?	19	59	22

		several times a week %	several times a month %	a few times %	never %	no computer %
38	If you have a computer at home, how often did you use it for preparing for teaching?	37	23	33	0	7
					Yes %	No %
39	Are you currently using technology to collaborate with other teachers (professional chat rooms, forums, network system or the like)?				45	55
			> 12 %	6 11 %	1 5 %	None %
40	How many e-mail messages do you send each week on average?		45	13	35	7

How many of the following have you ever done? Please tick the appropriate boxes.				
41	made changes to a computer s hardware			10
42	updated an application program (word processor, graphics program, etc.)			35
43	recovered a damaged file			25
44	created a web site			65
45	developed a data base			47

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[1] http://www.crescent .edu.sg/crescent/school/htm.

[2] Each year all Secondary Schools are ranked based on the pupils performance in the Singapore-Cambridge General Certificate of Education, `O Level Examination.

[3] When a cohort of pupils sitting for the Singapore Cambridge General Certificate of Education, `O Level Examination perform better than the projected target (projection is based on the pupils PSLE scores), it is considered as value-added performance.

[4] Refer to Singapore Country Paper (pg 4).

[5] Refer to Singapore Country Report Paper (pg 2).

[6] CGS IT Plan 2001.

[7] Refer to Singapore Country Report Paper (pg 1)

[8] Jalan is a Malay word meaning walk and Jalan-jalan implies the slow and easy pace of walking, an approach adopted by the slow teachers