

CHAPTER 4

A description of the setting

This study is concerned with the technology adoption process in four pilot smart schools in the Klang Valley. As it is not possible to understand the change process without knowing something of the setting in which the change is occurring, this chapter paints for the reader a visual picture of the case study schools so that he/she may visualize the setting which constitutes the backdrop to the study. In the later part of this chapter, an attempt is also made to come up with a profile of the technology-using teachers based on their responses to technology use.

A point to note is that the names of all case study schools in this study have been changed to protect the identities of the real participants. As such, Rajawali refers to a secondary school named *Sekolah Menengah Rajawali*, Gemilang to *Sekolah Menengah Gemilang*, Sendayan to *Sekolah Menengah Sendayan* and Temasik to *Sekolah Menengah Temasik*. The names of the case study teachers are also pseudonyms and any perceived semblance to teachers in real schools is purely coincidental and conjectural.

The schools

Rajawali

The first sight of Rajawali usually takes one's breath away. After the smog-filled city, the fresh beauty of the suburban countryside in which the school is nestled acts like balm to the soul. The school itself is attractively designed. Sprawled in a north-south

orientation, the ultra-modern buildings in shades of beige and orange overlook a large lake. Its red roofs sparkle in the sun. Beautiful landscaping and flowers lend a somewhat surreal touch to the surroundings. The facilities are excellent – an open-air amphitheatre, a hall which seats 13,000, six large badminton courts and a stadium of international stature. Rajawali is indeed a showcase school. The school is designed with functionality as well as aesthetics in mind; there is even anti-static vinyl flooring in the computer labs to absorb noise and dust so that students can study in maximum comfort.

As a level 'A' public smart school, Rajawali boasts of excellent IT facilities. However, at the time that field work commenced in 2000, the IT infrastructure was not yet fully laid out. Nevertheless, the school had 86 stand-alone computers, two scanners and four printers. This infrastructure was upgraded towards the end of 2000 when fibre optic trunking was laid out and more hardware brought in. Two ISDN lines, for video conferencing and as back-up for the lease line, were installed.

The beginning of the academic year 2001 saw the school equipped with 535 computers, all networked with an integrated assessment and school management system. The school was linked in a wide area network (WAN) via Telekom Malaysia's Corporate Information Superhighway (COINS) network. Internet access was through a data center set up at the Ministry's Education Technology Division which monitored and restricted access via a firewall. All 40 classrooms were each equipped with seven computers and a 29-inch mounted television set connected to the teacher's computer. In addition, seven science labs and two computer labs were fitted with seven and 35 computers respectively. The number of computers in the teachers' room totaled 24. Other high-tech features included a multimedia studio with 15 computers, a resource room with 6 computers, 8

self-access centers with 2 computers, respectively, and a computer in the counsellor's room. The school's IT network was supported by 6 servers.

Population-wise, the student enrolment was low as the school was new. In January 2000, there were only 300 students and 40 teachers but by the end of field work in mid 2001, the number of students had doubled and teaching staff had increased to 60. The advantage of the low student enrolment meant a comfortable student-to-computer ratio of less than 8:1. Although the students had no Internet access in the school for much of the year 2000, an IT-savvy teacher donated a modem which provided teachers with dial-up Internet access.

The students, predominantly of Malay ethnic origin, ranged from 13 to 18 years. An examination of the school register showed that 25% of the students were from middle income homes while the rest came from families of drivers, clerks or security guards. The low socio-economic status of the majority of the students suggested low home computer ownership. This was later verified by a random survey on two classes of students which confirmed that only 33% had home computer access and 19% had Internet access. However, the large pool of technology-trained teachers in the school (12 in all) meant that Rajawali had a definite lead in the technology initiative, at least during the research time frame.

Gemilang

Gemilang is a co-educational, public secondary school located in a prime residential housing scheme. Set up in the 1980s on nine acres of gently undulating land to

cater to the needs of about 90 children, the school rapidly expanded until, in January 2000, it boasted a student population of 1400 and a teaching staff of 77.

The school itself comprises five main blocks tucked snugly out of sight from the main road by lush greenery. With 22 classrooms, seven science labs, a school hall, four workshops, two prayer rooms, a library with more than 5,000 books, a large school field, badminton court, cricket pitch, tennis court, gymnasium and volleyball court, the school is well-equipped to handle the needs of its students.

In the 1990s, the school principal, a dynamic lady with a technology vision and mission, worked hard to upgrade the IT facilities in the school. She enlisted the help of the local community and managed to set up a computer lab with the aid of a private sponsor. In recognition of her efforts and the commitment shown by the teachers, the school was declared a Research & Development school and in 1998, selected as one of the 78 pioneer level 'B' smart schools in the country.

The official designation of the school as a pilot smart school gave its IT programme a boost. By the year 2000, the number of computers in the school had increased to 68 including 21 in a computer lab, 24 in a multimedia lab and 12 in a hypermedia lab open to student use after school hours. Another three computers were placed in the science lab, five in the administrative block and three in the teachers' room. The servers were housed in a separate room with a hub and a web ramp. The school was also given an LCD panel, CD writer and a digital video with motion video capture and broadcast system.

The students hailed from diverse backgrounds. Although the majority came from middle and high income families, about one-third were the children of immigrants from a

nearby squatter area. A questionnaire distributed by the school administration to 305 Form 1 students in January 2000 revealed that about 67% of them had computers at home or were at least exposed to computer literacy programmes (G:2.7.00.2).

From amongst the teaching staff of 77, only 5 had been trained in the Smart School programme. Nevertheless, the school was fortunate as its IT coordinator – a young man who, in the early days of the IT initiative, worked long hours and even slept in the school while setting up the IT infrastructure – was passionately dedicated to promoting IT use in school. In the opinion of the teachers interviewed, much of the credit for the success of the IT initiative in the school went to the principal and this dedicated IT coordinator.

Temasik

Temasik is an all-boys, public secondary school located right in the heart of the city. A former mission school with vast grounds and majestic buildings reflecting the colonial-style architecture of a hundred years ago, the school is both splendid and regal. This is definitely a school with tradition – the students walk around, addressing their seniors as ‘sirs’ while the discipline master makes stentorian rounds with a cane in hand. The physical amenities are commendable. There is a lecture hall, a swimming pool, a museum which houses relics from pre-war days and even a Robinson Crusoe-style scouts’ den. The clock tower is affectionately billed ‘Big Ben’ and an open courtyard – ‘the quadrangle’ to the boys – houses meetings and assemblies, held in the manner of the British public schools of colonial yesteryears.

In January 2000, the school had about 1,300 students and 85 teachers. Students were admitted on merit and boarding facilities were available for those from rural homes. The majority of the students were from affluent backgrounds; many were the children of successful entrepreneur families who regarded Temasik as their alma mater and THE school for their children. Students' home access to computers was thus not a problem.

The move towards aggressively integrating technology into instruction started in 1997 when a private sponsor presented the school with 41 computers and a server as well as training packages for the teachers. By early 1999, another 2 computer labs with 25 and 16 computers, respectively, had been set up.

The IT initiative was given a further boost when the school was designated a pilot smart school in 1998. Upgrading of the technology infrastructure started the following year with the addition of another 37 computers, 2 notebooks, 4 laser printers, a colour printer, CD writer, scanner, digital camera and 2 LCDs. A classroom on the ground floor was converted into a multimedia room and equipped with 11 computers, two printers and a scanner. Even the science lab was provided with a computer.

Fund-raising efforts by the school principal and teachers resulted in the setting up of two fully air-conditioned simulation rooms, each equipped with four stand-alone computers respectively. Another reason for the pervasive IT culture in the school was the Cyber Brigade, a computer club totally managed by the students. That, plus the fact that the school had eight smart school-trained teachers, a competent IT coordinator and an IT specialist who taught IT as an examination subject at upper secondary level, meant that the school was more than ready for the full roll out of technology-integrated instruction when its upgrading exercise was completed by May 2000.

Sendayan High

Just like Temasik, Sendayan High is a former mission school established in the late 19th century on 7.9 hectares of prime land in the heart of the city. Unlike Temasik however, Sendayan High is an all girls' public secondary school and its location in the commercial hub of the city means that there was little room to physically expand. Consequently, plans were made to relocate the school premises to a new high-tech building outside the city. However, during the first half of field observations, the school was still housed on the old premises where the skyline, dotted with modern skyscrapers and run-down pre-war buildings, bore testimony to the unique juxtaposition of old and new in that particular enclave.

In January 2000, the school's student population was 1,400 while teaching staff numbered 86. The school was highly regarded in the local community as it had a track record of excellence in public examinations. However, the lack of physical space for development meant limited space for setting up new IT infrastructure, and there were only 2 simulation rooms with 24 computers supported by a dial-up line and two hubs. Nonetheless, computer literacy classes run by a private company honed students' IT skills for a nominal RM10 per month.

In January 2001, the school shifted to its new premises with 535 computers, fully-wired classrooms and high-tech facilities similar to those at Rajawali. The school principal, a dynamic woman who had been pushing for the IT initiative even when the school was at its old premises, was ecstatic. She had lots of technology plans she wanted to implement. The pro-technology leadership coupled with the large number of IT-

trained teachers (22 in the year 2000) in the school gave it a definite advantage in the technology implementation initiative.

Summary

To sum up, the four case study schools were public, technologically-enriched secondary schools staffed by a core group of teachers who had undergone special training to implement technology-integrated instruction. However, the levels of IT infrastructure varied and the schools had different cultural and physical settings. The main characteristics of the schools are summarized as in Table 5 below.

Table 5 : The case study schools

Name	Type	IT level	Number of students*	Number of teachers*	Number of computers*
<i>Rajawali</i>	Public secondary, co-educational	A	600	60	535
<i>Gemilang</i>	Public secondary, co-educational	B	1400	77	68
<i>Temasik</i>	Public secondary, all-boys	B	1307	85	98
<i>Sendayan High</i>	Public secondary, all-girls	B → A**	1375	86	535

* Figures taken in February 2001

** This school was upgraded to Level A after shifting to its new premises in 2001

The teachers

Based on observations of the 47 teachers in the school setting, the following profile of technology using teachers was drawn.

Shah : The trailblazer

An earnest man in his mid-forties, Shah had tried his hand at banking and insurance before venturing into teaching. He was passionately interested in technology and spent much of his free time tinkering with computers, sometimes till the wee hours of the morning, and attending technology-related workshops on weekends: “I like IT... I’m self trained...” he explained as he gestured proudly to the plethora of computer-related books scattered on his work table in school (R:12.6.00.2).

He was thrilled when he first learnt about the smart school project as he perceived it as a golden opportunity to specialize in a field he liked. He applied to participate in the training programme and was delighted when posted to serve in a pilot smart school upon completion of training.

At Rajawali, Shah blazed the trail as a technology man. Asked to teach Bahasa Malaysia, he ended up integrating technology into his teaching whenever possible: “...(I) used technology for almost all lessons” (R:12.6.00.2). He was in his element, often staying back to help other teachers troubleshoot and sort out technical glitches. His talent did not go unnoticed and he soon found himself singled out to prepare school brochures and slide presentations for the constant stream of visitors. As he himself put it: “Anything to do with design (computers), HM (the headmaster or principal) comes to me...” (R:12.6.00.2).

Shah revelled in his role as a pioneer of IT use in the school. He created templates for his colleagues and helped conduct technology-related staff development courses. When the school was invited to participate in a national-level video conferencing project, Shah readily contributed time and expertise, driving the students around the wetlands to snap pictures to be uploaded onto computers. He was also the prime mover behind the development of the school's homepage.

When Rajawali found herself short of an Accounts teacher and Shah's background in Economics made him the most suitable candidate to take over, he agreed to switch subjects. Accounts was not one of the four subjects included in the pioneer phase of the technology implementation initiative but that did not deter Shah from integrating technology into instruction. In just a matter of weeks, Shah again blazed the trail, creating templates of ledgers, journals and cash books which he readily shared with other teachers. His enthusiasm for technology use was infectious and he was soon perceived as THE technology resource person in the school. A colleague described him thus:

When I find something new, I share with (Shah) and he gets interested in what I find. He gets very interested. Like the other time, I saw this smart classroom management (system) in the Internet. I told him the next day. And he actually went to the site and he actually bought the thing. He bought it, he paid with his own money because he felt it was good. You see, we have people like this, eh... it becomes very, very motivating for you, you know. I get excited...

(R:21.8.00:7)

Coffee breaks with Shah usually meant a discussion on computers and teachers actively sought him for advice. A colleague commented:

(Shah is one of) a few people I enjoy talking to here, about technology. We try to look at things from a different perspective, from a new angle and we try to do something on our own. He's very good, he loves technology

(R:21.8.00:7)

A check of the entries in the logbook which recorded teachers' use of the Internet line in school showed that Shah surfed the Net at least two to three times a week. He readily shared his knowledge with his peers. Once, after meeting teachers from the United Kingdom, he sourced for online information on e-learning and printed a load of material which he distributed to his colleagues.

However, Shah was also a discerning user of technology and constantly worried about the impact of technology use on the students. He readily admitted that integrating IT into instruction posed an extra burden to students as it required them to acquire an extra skill:

(If) no technology, they do better because teaching and learning (is) simpler...

(R:12.6.00.3)

He perceived implementation problems as the main obstacle to technology integration and cited the dichotomy between the idealism of the smart school vision and the harsh realities in school as the primary source of disenchantment among teachers involved in the pilot smart school pilot project:

Kita ini dwi alam... fantasi dan realiti (we are living in two worlds – fantasy and reality.)

(R:12.6.00.2)

He acknowledged his helplessness to move the technology initiative forward on a national basis,

I'm a small man, MOE has to do it (implementation), I can't start *bestari* (smart school)... the man who pulled the trigger has to continue...

(R:12.6.00.1)

but remained convinced that technology was the way forward and consequently strove to do whatever he could to accelerate its adoption in the school: “the world is moving towards IT, if don't use, students *rugi* (lose out)...” (R:12.6.00.3). Thus, true to the spirit of a pioneering leader, he blazed on, lighting the way for others to follow in his wake.

[Note: Shah is a trailblazer because he leads others in the technology initiative. He is passionate about IT. Before an innovation can take root, people like Shah are essential as they play a fire-lighting role, igniting sparks which get the fire going and fanning the flames for diffusion. However, this does not mean that trailblazers blaze all the time as field notes show instances when even Shah encountered problems and faltered! But the strength and beauty of trailblazers is that they move under their own steam and are sustained by their faith and belief. And so it is with Shah – his enthusiasm nosedives at times, but, as is typical with trailblazers, he soon picks himself up and resumes his fire-lighting role in the technology-adoption process.]

Ling : The beacon

Ling celebrated her 45th birthday recently. An experienced teacher with more than 20 years' experience, she holds a diploma in English and a Master's degree in Media Technology from the United Kingdom. The eldest in a conservative family, she had quit school early to help ease the financial burden at home:

I am the eldest and the only girl, and my father felt that sons should be given priority in education

(R:18.6.00.4)

Consequently, she “wandered into teaching” when, at the age of 21, she applied to a local teacher training college and subsequently entered the teaching profession (R:18.6.00.4).

Ling liked being a teacher. Her interest in teaching took a new turn when she started working with computers in the university and she discovered her aptitude for them – “I enjoy doing computer and... I zoomed into computers...” (R:18.6.00.4). Her initial forays into computer-aided instruction sparked off a long-term love affair:

It's my pet thing now... I really enjoy computers, authoring, and I find that using computers motivate the children a lot and that motivates me...

(R:18.6.00.4)

When the smart school project was initiated, Ling applied to participate in the training programme: “(It)... is the kind of thing I like, right up my doorstep” (R:18.6.00.5). Upon being posted to Rajawali, Ling was delighted because she felt that it offered more opportunities for her to explore and experiment with technology-integrated instruction:

... the smart school syllabus allow a lot of freedom (to explore technology) as we are not tied so much to specifications... given a big topic and could move round it... English teachers have a lot of (technology) resources if we are creative and resourceful...

(R:18.6.00.5)

Ling soon started using the authoring tools and templates she had brought back from the United Kingdom. The lack of readily available software did not deter her:

There's a global pool of expertise online. I surf... at least, I know what people are doing around the world... there's a teacher from Finland who's in schools. She's good. I also get ideas which I can use from the Listserve. I got Hot Potatoes from there...

(R:4.7.00.1)

But she admitted to encountering problems in her efforts to integrate technology into her lessons:

(I)... seemed to be going off tangent, seemed to be struggling... I was struggling between KBSM and *Bestari*. I find that *Bestari* is very student-centered, self paced. I find that I'm not able to do that just yet. I'm still chalk and talk. I'm still struggling towards independent learning

(R:18.6.00.6)

Top on her list of problems was time constraints. As she put it:

(Computer-integrated instruction) need a large backing of resources. We have a wee bit. I use some, but a teacher, I like to come up with my own resources. And that take time, time I don't have... Also, we are pretty exam-oriented, have to produce good results, familiarise students with exam format, drills. Computer time eats into my time for drills and practice

(R:18.6.00.6)

Ling also felt that teachers were over burdened with non-teaching duties:

...non-teaching expectations eats up a lot of time – administration, visitors, co-curriculum, see which glass is broken, have to see defects in the building... yes, a few of us have to do this. No maintenance personnel to look at school building maintenance...

(R:18.6.00.7~8)

She realized that there was a novelty element attached to technology-integrated instruction which teachers needed to beware of:

Once the novelty of IT is gone, then we have to be more serious, more content based. Once the bells and whistles are gone, have to go down to the core business, the content, the language...

(R:18.6.00.7)

Perhaps the one characteristic which set Ling apart from the other teachers was her independence – she had clear ideas of what she wanted to do and how to go about it, and unlike the other teachers, was not waiting for learning packages from MOE:

I'll accept the package when it comes. The CDs (are) just one teeny drop in the ocean... (I) don't even use the textbook all the time. I look at the scheme of work, topic, skill, see which ILO (*intended learning outcome*) fits it, then I'll think what I can do. I'm an on-the-spot sort of person, see something with potential, how can make it into a nice exercise, teach from it and make some computer-based lesson. Takes time but I enjoy it... To get ideas, I look at the package but I like to do my own; don't have to see into other people's minds. I'm a bit wary of the package, I think even when it comes, I'll still be doing my own thing. We are teachers, build our own materials but that's the joy of teaching, to be creative...

(R:18.6.00.8)

To Ling, the best reason for integrating technology into lessons was the response it elicited from students: “(They get) so excited and motivated...” (R:4.7.00.1). She felt the technology provided her with a bridge to her students:

Even if they don't learn much English, I know they're with the lesson and with me, they're getting closer to the language and to me, and they are at least learning technology...

(R:4.7.00.3)

[Note: Just like Shah, Ling is an innovator and a technology champion. Her belief in the merit of technology empowers her and gives her a strong sense of self and possibility. In that sense, both Shah and Ling are imbued with the personal mastery described by Senge (1990) as vital to the change process. This sense of personal mastery nurtures creative tension within Ling and inspires her to persist with pedagogical explorations, even when others around her falter. An introvert, Ling does not exhibit fire-lighting tendencies or try to 'sell' technology and win teachers over. However, through her unwavering personal commitment to technology use, she becomes a role model to peers who try to emulate her. For that reason, Ling is described as a beacon, shining brightly at sea and guiding others.]

Chin : The survivor / strategist adopter

Forty year-old Chin is a veteran teacher with 15 years of experience behind her. She entered the teaching profession at the encouragement of her husband, a conservative man who perceived the teaching profession as ideal for women juggling career with

family life. Chin had readily agreed. The result is a family unit comfortably ensconced in a lovely home just behind the school where she teaches Science and Mathematics.

Chin enjoys her work and is a devoted wife and mother. It is hardly surprising that she hopes to teach in her present school till she retires: “My house is just behind the school... I don’t see myself asking to be transferred out” (G:12.6.00.3).

Her initiation into the world of computers started when she was selected by the principal to attend the 14 weeks’ smart school training programme. Upon completion of training, she bought a personal computer – which she regarded as a “sophisticated typewriter” (G:12.6.00.3) – but was reluctant to integrate technology into her lessons due to various reasons. Her first excuse was that her class was too large and the abilities of the students too diverse to allow technology to be used in the classroom smoothly. Then, she cited the problem of student discipline:

Using IT is not easy because the students don’t behave well...
cannot take no for an answer...
(G:12.6.00.3)

She explained:

The minute (students) go into any lab, they’ll do what they want,
totally disobedient... They’ll give you heart attack...
(G:21.4.00.1~2)

Field notes showed that she struggled with the ‘maintaining discipline versus introducing technology’ dilemma throughout the entire duration of the study. She said:

Her response?

I'll toe the line. What if they transfer me out? My house is just behind the school...

(G:20.3.01.1)

Thus, Chin's decision to adopt technology was due not so much to her belief in its merit as to her desire to remain in the good books of the school administration. She was happy in the school and feared incurring the displeasure of the principal and getting transferred out. Consequently, when there was top-down pressure to adopt technology, she embraced it in order to please the principal. In a way, her adoption of technology can be perceived as a strategy to win approval. She was astute enough to realize that to survive comfortably at Gemilang, she had to devise ways to please the people in charge. For this reason, she is actually a strategist adopter as she adopted the technology as a way to work the system to her benefit. As subsequent field work showed, Chin's strategy paid off when her enthusiasm and efforts were noticed by the principal who rewarded her with an excellent appraisal report culminating in a double pay increment.

Chin's strategic adoption also invoked an unexpected bonus when she found herself enjoying new warmth and collegiality with her peers as a result of her involvement in technology-related staff development programmes:

The science teachers all very keen when I share with them the IT part of it. We explore together, scold the computer together...

(G:21.4.00.2)

Unfortunately, Chin's misgivings about technology use were never totally dispelled and this affected her instructional strategies which remained essentially teacher-centered despite being infused with technological elements.

[Note: Chin's profile is typical of many teachers who are not fervent technologists but wish to appear so. Although she has little passion for technology, she adopts it in order to strengthen her position at her workplace. In essence, her adoption of technology is little more than an attempt at self preservation and survival. For this reason, she is referred to, in this study, as a survivor or strategist adopter.

Chin's profile also illustrates clearly the impact that a teacher's belief systems has on subsequent patterns of practice with computers. Senge (1990) referred to these beliefs as mental models; Diamond (1993) described them as personal constructs from which teachers structured their thinking to choose between alternative roles. Chin's mental model of a good teacher is one who holds the locus of control firmly in her hand. Consequently, she persisted in structured, whole-class instruction and refused to relinquish control over the direction and pace of learning even after she integrated technology into her lessons. The technology became just an add-on, issued in lockstep fashion. The fact that Chin maintained this typology of technology use for one and a half years suggests the tremendous impact of mental models on teachers' responses to technology.

Perhaps Chin's reluctance to relinquish classroom control can be better understood given the context of the state of discipline in schools during the research time frame. At that particular point in time, student indiscipline was at an all-time low, with

serious cases of indiscipline reported almost every other day in the daily tabloids. Given that kind of scenario, it is perhaps hardly surprising that Chin was reluctant to embrace an innovation which required transferring the locus of power to students.]

Anna : The fence-sitter / ambivalent adopter

After graduating with a degree in English, Anna entered the teaching profession because she wanted to work with young people. This decision seemed to have been the right move for her as, eight years down the road, Anna still enjoyed her work. Blessed with a cheerful disposition, Anna treated her students as friends and they seemed to reciprocate her feelings.

When asked by the school principal to attend the 14 weeks' smart school programme, Anna was initially hesitant as she perceived herself as not technically-inclined: "I personally am not so computer savvy... wiring, plugging, I don't dare touch that" (T:14.9.00.7). However, she eventually agreed and was pleasantly surprised by the alternatives made possible by the technology. Upon returning to Temasik after the training programme, she was unable to immediately put her newly-acquired technology skills into practice because of major upgrading to the school's IT infrastructure. By the time the infrastructure was ready, she found that her IT skills had also plummeted: "I've forgotten how to do Web page, etc. I tell you, if we don't practice our skills after the training, we'll forget" (T:15.8.00.1). Consequently, she shelved the technology aside and resolved to let things be.

However, she was not allowed to be impartial to the technology wave for long. She was pushed to adopt technology and the push came from an unexpected source – her

students! They were bright boys and full of enthusiasm for the technology. To them, technology was “cool”. Some came from well-to-do homes and were very IT-savvy. When Anna explained that she lacked sophisticated IT skills, they offered to help her. Soon, she was actively implementing technology-integrated instruction in the classroom, with the students as her assistants:

I do depend on the students to help me out... I have very good students who are very sure of what they are doing...like my superior had mentioned that it would be better to have all the students' presentation in one or two diskettes, something about zip or unzip or whatever. I'm not so clear about that. I sort of talked with the students about that and asked them, some of them say 'There are certain things that you need', some diskettes or something, these things I'm not so clear but they are very clear about it and they do tell me. I do depend on them because they are so familiar with it...

(T:14.9.00.7)

Anna readily admitted that without the assistance of her students, she would probably not have bothered to use any technology as she would be “... caught with pants down” (T:26.7.00.2).

Anna's adoption of the technology was thus due to external stimuli. Initially a fence-sitter ambivalent about technology use, she was coerced into adopting technology by IT-savvy students who promised to handle technical glitches. She complied with their wishes because by doing so, she received the psychic rewards (Lortie, 1975) that she so clearly valued.

However, it is precisely because students were her main motivating force that her pattern of use was also affected by them, with peaks and dips in usage generated by their

responses to her efforts. For instance, in the academic year 2001, Anna's use of technology dropped drastically because of the students' negative responses:

I don't know what's wrong with the students this year. I asked them to download something from the Internet, only one out of 36 handed in their work. It's not the language problem, they're real chatter boxes. It's not access, we have the computers. I don't know why, but they're so different from the students last year. I don't really see (myself) using it (the technology) this year...

(T:18.3.01.1)

Her efforts dipped again when problems with class control cropped up – “(This batch of) boys are so boisterous (when using technology)...” (T:15.8.00.1) – and when she noted the “tendency for those who are familiar with computers to dominate” (T:14.9.00.7~8).

Variation in student abilities and problems with language also gave her reason to pause:

The good are excellent but not everyone is good... in a class, some are so weak, especially the students from the FELDA schemes, cannot understand instructions even...

(T:15.8.00.1)

Once, an unpleasant experience with students put her off technology use for more than a month:

They messed up the screen... I trusted them wholeheartedly and I believed that they would be sincere but they changed the screen or configuration. The IT teacher had to redo it...

(T:14.9.00.8)

However, there were also spells of intensive technology use. A review of her teaching record book showed a peak in usage in the second week of September 2000 when she used the technology every day for two weeks.

Her reason? Because the students loved the technology and had fun with it in the classroom: “IT does add a lot of colour to the class activity” (T:14.9.00.8). Perhaps Anna herself best summed things up when she said:

Starting using IT is difficult. (Teachers) need motivation – internal and external. Teachers need to be motivated, self motivated. Students' response (is so) important...

(T:19.3.01.3)

[Note: Anna is essentially a fence-sitter in the technology game. She is neither pro nor against technology use. However, she values rapport with her students and is prepared to adopt technology in order to please them. But when faced with students who are less keen on technology, she readily switches to more passive pedagogy which demands less energy. Perhaps Anna's actions stem from her inner conviction that as a teacher, she needs the students' cooperation to ensure that her instruction is successful. Consequently, she adopts and rejects technology based on the students' preferences and not because she believes in technology or possesses personal mastery over it. In other words, she is neutral about technology use and is thus described as an ambivalent adopter. Anna's profile is the most commonly observed profile among the teachers in the case study schools – most of the teachers appeared to be sitting on the fence and ready to either adopt or reject the innovation depending on external push factors].

Mei : The resistor

Mei is a petite 38-year-old teacher who had been teaching Mathematics for 12 years at Sendayan High before she was asked to attend the 14 weeks' smart school training programme. She enjoyed the course, welcoming it as a diversion from the usual

routine but brushed off suggestions that she seriously integrate technology into her lessons. Initially, her reasons for not adopting technology was because of the lack of availability of technology and difficulty in access:

Right now, we can only enter (the simulation room) once a week. And that is only on the first and third week. The second and the fourth (week) are for English and Malay

(S:18.2.00.2)

But later, when the principal worked out a schedule which allowed every teacher access to the simulation room on a regular basis, Mei still refrained from adopting the technology wholeheartedly – "... a little bit, a little bit, that's all" (S:4.3.00.1). Her complaint was insufficient space : "...the room is too crowded-*lah*. Not enough empty space to move" (S:16.3.00.1).

Throughout the duration of the study, Mei voiced multiple reasons for rejecting the technology. At one point, she cited the lack of software on Mathematics. When referred to the large amount of material on the Web, she lamented the students' difficulty in translating Mathematical terms from Bahasa Malaysia into English as another reason for non-adoption. Later, she talked about the inherent difficulty of integrating technology into Mathematics: "I see ah, very difficult to implement for Maths..." (S:14.2.00.1).

Time constraints was another reason for her procrastination:

*I'm teaching Form 4 and 5, exam classes. Maths and Add Maths (Additional Mathematics)... you know Add Maths-*lah*, especially Add Maths, the syllabus is a lot. I don't think using the *bestari* way would work...*

(S:4.3.00.1)

She elaborated on her problem with time:

Time. Rushing to complete the syllabus. Here, ah, if don't finish the syllabus, parents will complain... Where got time? ... so much non-academic stuff too. This is the second month, already more than 10 meetings, stay back every afternoon...where got time for technology? (We) can't go away from chalk and talk... impossible to change things overnight...

(S:27.2.00.2)

The old system of evaluation which emphasized good grades was also cited as a reason for her reluctance to embrace technology:

We have to stop using it because the students are taking PMR and SPM – if anything happens, they (parents) will blame us... we feel that it was not really working in terms of outcomes

(S:4.3.00.3)

Interestingly, Mei was not only unenthusiastic about using the technology but also reluctant to commit herself to technology use in the near future: “Really cannot say if I'm going to use it (in future). I don't know” (S:20.2.00.1).

[Note: Mei's profile is typical of a resistor to the innovation. Resistor profiles were found in all the case study schools although the number of teachers with this profile varied. Teachers with these profiles had closed minds towards the innovation and gave all types of reasons and excuses for not adopting the innovation irrespective of whether the reasons / excuses were founded or otherwise.]

Summary

To summarise, field observations of the teachers revealed that they fell into five distinct types – trailblazers, beacons, strategist users, ambivalent users and resisters.

Trail-blazing teachers were usually high profile innovators keen to experiment with technology in the classroom; their computer competencies were good and they exerted a great deal of influence over their peers. Teachers who were beacons were also in the technology frontline. They usually trailed after the trailblazers but were equally competent at computer and integration skills. However, strategic and ambivalent adopters of technology were usually less techno savvy and more preoccupied with efforts to handle the technology in the classroom. Consequently, they were less dynamic as opinion leaders and tended to fall in with decisions made by the majority in the group. The last profile that emerged from field observations was the resistor. Resistors were generally less receptive to changes, technologically less competent and tended to lag behind others in the technology adoption-diffusion process.

Table 6 below summarises the five profiles observed, as epitomized by teachers Shah, Ling, Chin, Anna and Mei.

Table 6 : The teachers

Name	Profile	Sex	Age	Subject taught	Forms taught	Academic qualifications	Teaching experience
Shah	Trailblazer	Male	45	B. Malaysia	2, 4, 5	Master degree	13 years
Ling	Beacon	Female	45	English	2, 3, 5	Master degree	24 years
Chin	Strategist	Female	40	Science	1, 2	Master degree	15 years
Anna	Ambivalent	Female	33	English	1, 2, 6	Master degree	8 years
Mei	Resistor	Female	38	Mathematics	2, 4, 5	Master degree	12 years

Towards developing a profile of the technology-using teachers

Different researchers have different ways of profiling technology-using teachers.

Bliss, Chandra and Cox (1986) adopted a seven-point scale – favourable, critical, worried, unfavourable, antagonistic, indifferent and uninitiated – to categorize teachers based on their attitudes to technology.

Honey and Moeller (1990) grouped technology-using teachers according to their pedagogical beliefs and practices – those with progressive pedagogical practices and high technology integration, those with progressive practices but technology ambivalence, those with progressive practices but lack opportunity to integrate technology and finally, those with traditional practices and technological refusal.

Wolcott (1977) profiled teachers based on their stances towards change and technology use in schools. He used the term 'educator moieties' and identified two distinct moieties – the technocrats and the craft teachers. The technocrats, usually comprising administrators and academicians, have progressive attitudes and future-oriented perspectives, valued efficiency, rational decision-making, have clearly-stated goals and measurable outcomes, and differed greatly in world views from the teacher moiety who were more classroom-based and concerned with the practicalities of teaching.

Aquila and Parish (1989) also categorized teachers into technical or craft types. The former embraced change, new technologies and improvement whilst the latter resisted change, focused on the individual and placed more premium on utilitarian knowledge.

As Figure 5 shows, the profile of technology-using teachers drawn from field observations can be perceived as a continuum of pedagogical practices with two totally divergent worldviews at both ends. At the technocrat end of the continuum are teachers like trailblazer Shah and beacon Ling who are future-oriented and progressive and see technology as the way forward. These teachers are the voyageurs keen to explore technology in the classroom.

At the other end of the continuum are the craft teachers who remain deeply devoted to the traditional paradigm, sometimes at the expense of innovative technologies. Resistor Mei typified this extreme.

In between these two extremes are teachers like Anna and Chin who exhibited worldviews with varying mixes of traditionalist and constructivist mindsets. A point to note is that fieldwork suggests the teachers' worldviews seemed to evolve and to change over time, as they experienced shifts in beliefs and mindsets.

This profile of technology-using teachers will be developed further in chapter 6. The next chapter examines the concerns of teachers directly confronted with the innovation in the school milieu.