
Title	Multimodal literacy in English language and literature teaching: The design, implementation and evaluation of a one-to-one wireless laptop programme in a Singapore high school
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FINAL WRITTEN REPORT



Multimodal literacy in English language and literature teaching: The design, implementation and evaluation of a one-to-one wireless laptop programme in a Singapore high school

By

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EXECUTIVE SUMMARY

Purpose

The study investigated what happens in English language and literature learning (ELLL) when every student in a particular school has a laptop computer for use in school and at home. The key issues at stake concerned the development of teachers' and students' capabilities in the use of digital tools, new media and multimodality in meeting curriculum and assessment requirements.

Background

Singapore foresees itself as niche shareholder in the emerging digital media market and has invested heavily in the integration of Information Technology in teaching and learning. However, high-quality, peer-reviewed research in the adoption of personalised learning devices in specific subject areas in local schools is not widespread.

Participants

The participants were nine teachers in the English language department including the Head of Department. Their professional teaching experience was spread across various levels (Secondary one to three), subjects (English language, English literature or both) and length of service ranging from two to over twenty years. The majority had undergone various kinds of one-to-one laptop training. A limited number of students from Secondary 1 to 3 classes also contributed data through focus-group discussions and interviews.

Research Methodology / Design

The study was conducted over 24 months and followed *design experiment* prototyping practices and descriptive/exploratory case study methods. The data were collected mainly through questionnaires, classroom observations, meetings, informal conversations and interviews. These inputs were processed using a mixed methods approach involving descriptive statistics, multimodal analysis and the constant comparison of data.

Findings / Results

1. There was a complex web of relationships between stakeholders that influenced ELLL pedagogy and practices in the school. At times, this translated into an unclear and uneven picture of professional practice in the implementation of the laptop initiative—especially at the start of the study.
2. Despite widespread digital access, teachers opted for direct, print/word-based, instructional methods and maintained their positional and epistemic authority.
3. Regardless of tight classroom control, our detailed description and analysis showed that students were able to create and communicate meanings using a range of representation modes.
4. The IT and linguistic skills-based rubrics in summative assessments used did not encompass subtle multimodal design.
5. As far as teachers' professional development and learning were concerned, the researchers experimented with a combined concerns-based and iterative cogenative learning model.
6. Two units of work were produced to road-test ideas in meaningful laptop use and the benefits of conversational pedagogical mentoring in task and assessment design. This work, which produced some good academic content and positive professional learning experiences, highlighted the need to further build teachers' capabilities as knowledge brokers, peer-to-peer mentors and partners in teacher-student-researcher interactions.

Conclusion and Recommendations

The findings showed that one-to-one laptop English language and literature teaching and learning practices did not equate easily to the school's strategic plans and national policies relating to the use of digital tools and new media. Based on the aforementioned observations, five recommendations are made for future implementation:

- A different way of working is required that acknowledges, addresses and maps the inevitable shift of positional and epistemic authority, and technological expertise towards students, especially, in one-to-one laptop learning.
- Teachers have to work in subject and level specific professional learning communities that have the deliberate use of laptops as a primary concern. Teachers also need to confer with and coordinate their curriculum, assessment and pedagogical intentions with administrative and managerial colleagues. The purpose being to understand collectively what they are aiming to achieve in subject and level specific curriculum maps and articulate why this is important to students, in particular. English teachers' pedagogic conversations should be seriously considered as a new defining mark of inquiring, futures-oriented, one-to-one laptop language educators.
- Teachers are strongly encouraged to show leadership by allowing their students to make decisions about how work is completed and assessed.
- School administrators and managers need to give as much time and space as possible for teachers and students to mix, match and discuss their work openly and implement plans with fidelity to principled pedagogical action that is consistent with 21st Century ideals and requirements.
- What are required are clear aims and purposes related to the one-to-one laptop initiative in the school. These would include a variety of observable practices for teachers and students that can guide future policy implementations (see Appendix E).

Keywords

One-to-one laptop programmes; ubiquitous mobile learning; English language teaching and learning; teachers' professional development and learning.

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INTRODUCTION

There is a widespread belief that one-to-one computing—defined as the provision of a laptop computer to every staff member, teacher and student for continuous use both in the classroom and at home—has great potential to enhance teaching and learning in disciplinary and subject-based contexts (Khambari, Moses, & Wong, 2009; Livingston, 2009; McGrail, 2006; Mouza, Cavalier, & Nadolny, 2008; Sclater, Sicoly, Abrami, & Wade, 2006; Warschauer, 2006). Fundamentally, ubiquitous wireless computing in schools is empowering and exciting (Owen, Farsaii, Knezek, & Christensen, 2005) and has resulted, for example, in the USA, in increased outcomes on standardised tests of writing (Holcomb, 2009). Yet, teachers in one-to-one laptop classrooms also face a multitude of complex issues, including: challenges to existing teacher-centric practices (Burns & Polman, 2006), conflicts with the requirements of high-stakes written tests (McGrail, 2007), lack of consultation regarding participation in laptop classes (Rutledge, Duran, & Carroll-Miranda, 2007), dissatisfaction with professional development opportunities and technical training (Khambari, Moses, & Wong, 2009), frustrations with software incompatibility, and persistent technical failures (Dunleavy, Dexter, & Heinecke, 2007; Garthwait & Weller, 2005; Newhouse, 1999; Zehr, 2000).

Given these circumstances and the absence of copper-bottomed assurances for success, many schools are either abandoning or shying away from one-to-one laptop initiatives (cf. Holcomb, 2009). Unfortunately, it is not clear what could be done differently to bridge gaps (when they become evident) in one-to-one laptop contexts between, for example, policy conditions, professional and social concerns, and classroom pedagogy and practice.

A different and distinctive approach to one-to-one laptop implementation work moves beyond the overt barriers to change with computer technology towards a more positive account of events where incremental development and an analysis of how the conditions that make innovation difficult might be both understood in policy and social contexts and ameliorated by deliberate changes in classroom approaches. But to do this meaningfully requires situating one-to-one laptop practice within a specific subject domain, and context of instruction and learning.

The present study investigated one-to-one laptop computing in English language and literature learning (ELLL) in a particular school in Singapore. Given the importance placed nationally on knowing and using formal linguistic codes successfully and widely (Ministry of Education, Singapore, 2001) the researchers were curious about how pedagogy and schoolbased classroom practices could be influenced positively by the requirement to spread an increasing communicative load across multiple modes of representation using digital tools and multimedia as key mediators in curriculum design, and classroom implementation processes and procedures (Ministry of Education, Singapore, 2010).

The following research questions guided the study:

1. How is language usually produced in ELLL classrooms at the study school?
2. How do ELLL teachers and students balance multimodal meaning making and printbased academic literacies?
3. What objectives, if any, relate to multimodality at the study school?
4. Who can take leadership in designing multimodal literacies?
5. In terms of one-to-one laptop use at the study school, what are the costs and benefits of teacher-student-researcher partnerships in ELLL professional development and learning?

Two broad benefits of the study identified at the proposal stage were the: (i) provision of opportunities for teachers to engage in continuous learning about their practices, *in situ*, and (ii) use of data and publications from the study to enlighten local teachers, educational policymakers and educational researchers about the merits and pitfalls associated with the deployment of mass mobile learning in high school language education.

RESEARCH BACKGROUND

National context

Since its independence in 1965, Singapore has strived to develop a just and equal nation (Lee, 1998). Crucially, education has had a key role to play in meeting these objectives and the national education system is designed with two key ends in mind: (i) develop Singaporeans in the moral, cognitive, physical, social and aesthetic spheres of life, and (ii) foster responsibility to the community and country from which senses of purpose and identity can be derived (Ministry of Education, Singapore, 2009). The Singapore government is characteristically pragmatic in its form of governance and this orientation is clearly reflected in its educational policies. In particular, successive Information Technology (IT) Masterplans announced between 1997-2008, have emphasised the importance of technical skilling, customised learning, deep intellectual engagement; self-direction and flexibility in terms of where, when and how learning occurs (Ng, 2008). Looking forward, the government has invested heavily in an ambitious and extensive research, development and innovation agenda in digital media with the aim of creating a niche digital market share, wealth generation and job creation (Media Development Authority, Singapore, 2008). Overall, policy-makers in Singapore envision a future where:

Learners in 2015 will access the latest learning resources using personalised learning devices. Content will be delivered via ultra high-speed broadband networks. Learners can choose to learn at any place, leveraging on pervasive wireless access. Learners collaborate with one another over the network, using collaborative tools. Educators guide learners, by customising learning plans and resources, and using new assessment tools to monitor their progress. The habits of independent search, integration and construction of knowledge and the skills acquired from working together with others will equip our people to continue to adapt and learn. (Infocomm Development Authority, Singapore, 2006, p. 5)

The Singapore government is currently testing a range of IT ideas through its "FutureSchools@Singapore programme where a small number of hand-picked schools are working with industry partners to pioneer and model new curriculum, assessment and learning practices (Infocomm Development Authority, Singapore, 2008). It is also worth noting that one-to-one laptop learning is gaining attention in Singapore but its adoption is not widely researched or publicised in high-quality, peer-reviewed journals especially at the subject-specific level.

Study context

Fox Hill Secondary¹ (FHS) is a well-established local institution given additional government funding and flexibility to develop holistic and innovative curricula and programmes designed to stretch its pupils to the fullest. Importantly, teachers at FHS are not tied to set texts and can plan yearly and/or half-yearly schemes of work (syllabi) independently at the departmental level. FHS is also implementing—through its own design and initiative—a school-wide infrastructure and curriculum development programme to improve its students' engagement in learning and strengthen their critical and creative capabilities. This plan consists of three interrelated components: (i) key programmes, (ii) people, and (iii) places.

The first element, programmes, involves redesigning the school's instructional delivery system so that each student has—through an individual purchasing scheme—a wireless laptop computer ensuring continuous, on-demand access to digital tools and resources both in and beyond school.² The school has also invested substantially in infrastructure building and provides broadband wireless connectivity in all classrooms and other specific hotspots (e.g., lobbies and canteen). Additionally, each classroom at FHS is equipped with an Interactive White Board (IWB), a conventional white board and data projection system. As far as pedagogy and classroom practices are concerned, emphasis is to be placed, via the crucial mediation of the laptops, on using a variety of semiotic modes (Jewitt, 2008; Jewitt & Kress, 2003; Kress & van Leeuwen, 2001), promoting research and developing oral presentation skills.

Second, teachers' professional learning is to be valued and catered to through leadership and collective learning activities. For example, teachers at FHS are expected to use their *protected time* (common non-teaching periods) to further enhance their understanding of their students' learning styles and preferences through individual and group-based critical reflection. The aim is that the protected time will facilitate better alignment between the use of suitable tools and resources to meet students' learning needs and interests.

Third, with places, FHS has invested heavily in creating multifunctional and collaborative learning spaces around wireless, interactive technologies. The school makes extensive use, for example, of dedicated servers for video streaming, data-loggers and a fully functional, high-definition, media centre.

Pilot study

At the invitation of the school's Principal, a pilot (baseline) study was conducted in 2008, into the use of laptops within the English language department. During the pilot, four teachers and the entire Secondary 1 student cohort (n=361) completed an online questionnaire in the use of Information and Communication Technology in ELLL. Several classroom observations were conducted with the selected teachers. These sessions were videotaped, coded *in-situ* using a classroom observation sheet, and followed up with individual professional development-oriented discussions with the participating teachers (see Towndrow & Vaish, 2009a, for further information).

Findings from the pilot study showed that ELLL was characterised by lecture-style presentations and explicit test preparation. Despite widespread access, the predominance of teacher-centred and print-based activities in the classroom meant that students were rarely required to explore digital tools and new media as sources of legitimate knowledge. Arguably, the students missed vital opportunities to investigate mobile technologies as sites for meaning-making and personal knowledge construction using multiple modes of representation (Ajayi, 2009; Towndrow & Vaish, 2009b).

Overall, the restricted use of digital technology in the pilot study classrooms signalled limited perspectives on the knowledge, skills and dispositions deemed necessary for successful life in the 21st century (see, for example, Jukes, McCain, & Crockett, 2010; Prensky, 2010; Tapscott, 2008). That is, while teachers at FHS were no doubt aware of the importance of technical competence in contemporary study and work contexts, other important areas that might have contributed to their students' improved academic achievement—including effective communication, innovative thinking and reflexivity—were not immediately apparent. Given these circumstances, there was evidence to suggest that the digital and print-based realms sat uncomfortably together in the school's English language and English literature classrooms at that time.

METHODOLOGY

Research design and participants

The study followed *design experiment* prototyping practices (Bannan-Ritland, 2003; Cobb et al., 2003) and descriptive case study methods (Cresswell, 1998; Freebody, 2003; Hitchcock & Hughes, 1995). The participants were nine teachers in the English language department at FHS (including the Head of Department). Their professional teaching experience was spread across various levels (Secondary one to three), subjects (English language, English literature or both) and length of service that ranged from two to over twenty years. The majority of the participants had undergone training pertaining to the one-to-one laptop implementation. There were also a limited number of students from Secondary 1 to 3 classes who contributed data through focus-group discussions and individual interviews. The school acted as institutional guarantor for the students during normal school hours.

FINDINGS AND DISCUSSION

Research question #1—How is language usually produced in ELLL classrooms at the study school?

The issue of how language is usually “produced” in ELLL classrooms at FHS relates in part to how the configuration and content of physical spaces, and teachers' movements etc. act as signs for what is required, valued and possible within the school subject, English (see, Kress et al., 2005). It also concerns how pedagogy is shaped by policies, priorities, ideas and beliefs about what constitutes subject-knowledge and how it is acquired. Two factors determining how ELLL was produced in this second sense were identified in the study.

First, it was established through on-site classroom observations, meetings with senior and middle managers, co-generated dialogues with participating teachers and focusgroup discussions with selected students that there was a complex web of relationships and lines of influence between various stakeholders in the department and school as a whole. These players included: the Ministry of Education, school leadership, teachers, level/subject coordinators, school professional development coordinators, Head of IT, school IT trainers, students, Head of English and finally, the researchers. Each of these individuals and/or groups seemed to interact in different ways depending on either strong, predictable connections (usually based on seniority or reporting lines) or weaker, contingent peer-to-peer associations. The upshot—especially at the start of the study—was a diverse and sometimes unclear picture of professional practice that translated unevenly into how the one-to-one laptop programme was understood, implemented and evaluated in classrooms.² An attempt was made early in the study to craft a unifying curriculum plan that set specific achievement outcomes relating to one-to-one-laptop based learning across the four years of schooling in the English department. However, the time available for inter-level meetings was limited and outline agreement could only be reached on non-contentious content and standardised assessment issues. Overall, no clear or obvious goals were evident relating to computer-mediated teaching and learning in the department.

Second, data from questionnaires, classroom visits, post-lesson interviews and other conversations, showed that some teachers were concerned about controlling instruction in their classrooms. For example, a teacher remarked:

Initially I allowed the students to use their laptops to type notes. Then I found some of them were surfing the net [behind my back].

And she added:

When I'm in class I want the students to listen to me alone. And ... the computers take that away.

Another colleague (with long-experience in the school) had some experience of working with IT but remained anxious about its use in class. She explained:

I see the power of the tools. It's just one apprehension: class control. I can only do it after I am assured and I have got them [the students].

In sum, there is some evidence to suggest that despite widespread access to digital tools and new media, teachers preferred direct instruction and required students' compliance with their content-specific plans. Arguably, this domineering approach made laptop use largely contingent on external conditions (extant levels of trust, not learning requirements necessarily) and restricted students' agency in their learning. If correct, this situation corroborates findings from the pilot study and appears contrary to the school's strategic plans relating to key programmes, people and places. It also provides an evidence-based foundation for attempting to work differently in task design, implementation and assessment through a targeted intervention programme.

Research question #2—How do ELLL teachers and students balance multimodal meaning making and print-based academic literacies?

Contrary to what might be thought or expected initially by technologists and official syllabus designers, multimodal literacies are not automatically perceived or afforded by dint of anytime, anywhere access to digital tools and new media, alone. Using data collected from classroom observations, innovations in teacher professional learning and ConcernsBased Adoption Modeling (CBAM) (questionnaires, interviews and customised professional learning programmes), the analysis of students' and teachers' work showed that the management of multimodal and print-based academic work was highly contingent on teachers' willingness to allow their students to produce rich multimedia-based artefacts and choose modes of representation that best met their perceived communicative needs.

Interestingly, though, detailed case study findings showed that learners were able to create meanings using a range of modes of representation (both individually or in combination) that went far beyond what might be normally expected in print-based academic work. For example, as part of a unit of work in narrative writing, Secondary 1 student, Jeremy (age 13) produced an exemplary digital story titled, "Places My Mum Fondly Remembers." The story described (second-hand) his mother's memories by presenting a series of retrospective vignettes from her experience as a Singaporean child living in a Housing and Development Board (HDB) flat in the Centre-West Queenstown neighbourhood. Textually, the story consisted of a collection of hand-drawn and digitally produced still images, audio recordings of his own spoken words, and a soundtrack song, all purposefully coordinated within a span of three minutes and two seconds. Visual transitions between images and 'camera' effects (pans and zooms) were also deployed as elements in Jeremy's design for meaning.

The teacher expressed (in a post-assessment interview) her pleasant surprise when she learnt he had deliberately used simple line drawings (see Figure 1) and an expressive

voice to convey a sense of childhood to his intended young audience. Arguably, if the downloaded rubric (see Appendix A) used to assess his work had been constructed differently, this student and his classmates might have gained (even more) credit for their ingenuity and adeptness as multimodal text designers.

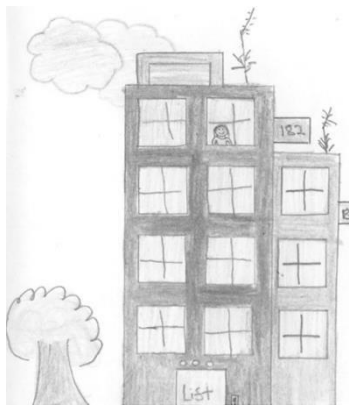


Figure 1. A simple (yet very effective) line drawing depicting a childhood experience in a student's digital story

The issue of balancing digital/academic literacies is taken up in RQ #4 below.

Research question #3—What objectives, if any, relate to multimodality at the study school?

Just as there were no clear curriculum objectives concerning one-to-one laptop learning, there were few, if any, explicit and observable goals set relating to multimodal meaning making in the English department. Based on classroom observations, meetings with the head of English, co-generated dialogues with participating teachers and focus group discussions with students, two circumstances served to explain this anomaly. The first situation was the ever-present and pressing demand to prepare students for pen-and-paper tests and high stakes assessments (see Kramer-Dahl, 2008 for verification of this priority setting in other secondary school English contexts in Singapore). The second (and concomitant) circumstance related to the predominance of task designs and lesson activities that only required the accurate reproduction of teachers' authoritative knowledge mainly through handwritten or typed texts. As a result, the students in the laptop programme were seldom required to explore mobile technologies as sites of exploratory learning and what they knew of the world (as often mediated by the use of their laptops) was rarely, if ever, invited into the classroom. Such was the prevalence of the restricted academic literacybased foci that many students stopped bringing their laptops to school because their machines were not needed for the class-based work set in all subjects (see Wang, 2010). In short, the available evidence demonstrated incongruity with wider governmental and school objectives for the use of digital media and personalised learning devices.

Research question #4—Who can take leadership in designing multimodal literacies?

Given that students are able to work intuitively with digital media and integrate (when required) their out-of-school experiences into classroom-based work (see RQ #2 above), it would be narrow-minded (and perhaps even obstructive) to insist that expertise in multimodal literacy matters resides exclusively with teachers—even those with long-service records or high levels of technological skilling.

Teachers would be better placed, it is contended, to balance multimodal/academic literacies and demonstrate leadership by designing and enacting learning and assessment tasks that provide opportunities for students to: (i) jointly discuss learning objectives/assessment rubrics and (ii) provide the flexibility for them to choose appropriate tools and strategies (both digital and analogue) to achieve desired and measurable

outcomes. The resulting expertise generated can then be shared through exemplary units of topic/theme work that have been trialled, revised and supplemented by teachers' notes, and illustrative students' work at specific grade/point levels.

As a part of an intervention with nominated and willing teachers that attempted to illuminate and adjudicate between curriculum decision-making and implementation factors, the researchers actively co-planned, co-taught and co-evaluated two level-specific units of work (one at Secondary 1 and the other at Secondary 3 in AY2010) using an iterative cogenerated model inspired by Roth and Tobin (2002). Importantly, this work was designed to work alongside existing departmental and school-wide initiatives (see Figure 2).

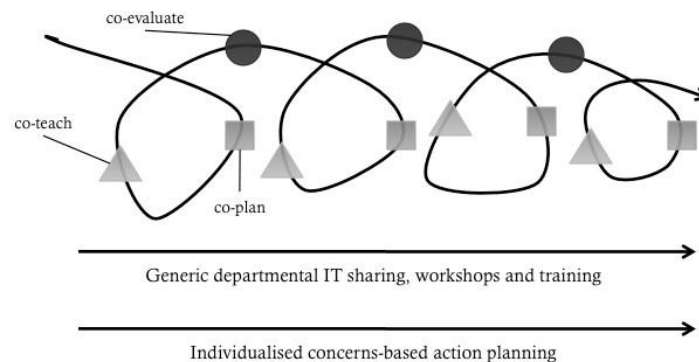


Figure 2. Iterative co-generated professional learning model

Figure 2 is a prototype for teacher professional development and learning over time. The central idea was that the partnerships would benefit mutually by engaging in a form of “pedagogical mentoring” in framing measurable and meaningful learning objectives, asking questions, monitoring students’ work, giving formative feedback, promoting critical and creative dialogue around big and essential questions in one-to-one-laptop based ELLL, and summative assessment (see Appendix B for the Secondary 1 unit summary coversheet and Appendix C for a sample Secondary 3 co-generated lesson plan). It is submitted that the model of iterative action planning in task design is potentially scalable and sustainable at FHS (and beyond to other schools) if teachers are willing and capable in acting as pedagogical mentors for each other.

In order to measure the effects of the intervention, the researchers adopted the Concerns-Based Adoption Model (CBAM) as a theoretical basis to focus specifically on the teachers who were considered the key players in bringing about change in their classrooms (cf. Donovan & Green, 2010; Donovan, Hartley, & Strudler, 2007; McKinnon & Nolan, 1989). Unlike some frameworks, for example, Levels of Technology implementation (LoTi) (Moersch, 1995) and The Apple Classrooms of Tomorrow (ACOT) (Sandholtz, Ringstaff, & Dwyer, 1997) that largely describe progress in the use of technology in educational innovations, the longstanding and validated CBAM model (Hall, Wallace, & Dosset, 1973) provides a suite of diagnostic tools for recording and analysing the impact of innovations in context from practitioners’ personal (and therefore unique) perspectives. The three main dimensions of the CBAM are the: (i) Stages of Concerns (SoC), (ii) Levels of Use and (iii) Innovation Configuration. The study, as reported here, focussed exclusively on the SoC diagnostic tool.

As shown in Table 1, there are seven, non-hierarchical, stages of concern that allow a Personalised Concerns Profile (PCP) to be constructed based on the relative intensity of an individual’s concerns. Reading in reverse order, Stage 0 (Awareness) identifies users who have little concern about or put much effort into the innovation. Stage 1 (Information) depicts users who have a general awareness of and are interested in learning more about the innovation. At Stage 2 (Personal) users are in doubt about the demands of the innovation and its effects on them. They may also be uncertain of their ability to meet the demands of

the innovation. Stage 3 (Management) reflects users who focus much or all of their time and effort on issues such as time-management, organising resources and managing schedules. This stage also indicates possible conflicts in managing the demands of the innovation and other interests (e.g. teaching). Stage 4 (Consequence) relates to how personal use of the innovation affects others (students and the community). Stage 5 (Collaboration) concerns working with other users of the innovation. Finally, at Stage 6 (Refocusing), users have clear ideas about other options that could work better than certain aspects of the present innovation.

Level	Stage of Concern
	6. Refocusing
Impact	5. Collaboration
	4. Consequence
Task	3. Management
Self	2. Personal
	1. Information
	0. Awareness

Table1. Levels and stages of concern

By way of illustration, two Secondary 3 teachers worked together with the research team in the planning, teaching and evaluation of a short unit of work in situational report writing. This consisted of seven teaching periods (four lessons totalling approximately three-and-a-half hours) over a period of two weeks. The task (see Appendix D) was enacted as mini-project work with students organised in groups of six to seven and located in a spacious learning environment equipped with six 42-inch LCD projection screens and lightweight seats with integrated tables.

In lesson 1, the teachers explained the task and group leaders were appointed. Next, the technical aspects of the assignment were outlined (use of the LCD screens and cables) and the software to be used—a wiki-like collaborative environment—was demonstrated and quickly learnt. In lesson 2, the student-groups began brainstorming ideas for their reports using a range of self-selected software (e.g., word-processor, mind-mapping, electronic slideshow) and the Internet. The co-teachers monitored and discussed the students' work on a group-by-group basis. The students used the feedback to produce and modify a first-draft of their reports. In lesson 3, the students fine-tuned and uploaded their work to group-pages on the wiki. Each group then invited members from another nominated group to post comments on the wiki in a peer-review exercise (guidance was provided by the co-teachers on what to look out for and how to frame comments positively). At the end of the third lesson, the student-groups were instructed to modify their report drafts based on the peer-generated comments received. In the fourth and final lesson, the students-groups presented their final pieces to work to each other in a gallery walk around the room. The FHS teachers assessed the students' work using a specially prepared situational report-writing rubric. The students also peer-assessed each other within and across their groups. Based on samples of students' work received, the reports consistently showed a clear understanding of purpose and detailed support was given for substantive points made. While some grammar mistakes were evident, the students seemed to write expressively and expansively (often exceeding the stated word limit).

In an attempt to capture the professional learning that occurred in and through the unit of work interventions, post hoc dialogues were conducted individually with the Secondary 1 and Secondary 3 teachers involved. These conversations, which were digitally recorded and transcribed verbatim, surfaced numerous points for consideration in future iterations of the model, including: time-management, reflective practice, lesson debriefing, personal development, sustainability and the transfer of learning, and teacher selfawareness.

The FHS Secondary 1 teacher involved, who had just a couple of years teaching experience but was nonetheless technologically proficient, said she benefitted from the opportunities to discuss her teaching with others. When reflecting on how her students had used IT in a series of lessons in summary writing, she noted how they had exceeded her initial expectations:

I was 'wow', you know, they could handle it.

Through this comment she realised and admitted she needed to trust her students more and not underestimate their abilities.

With respect to the sustainability of the lesson designing innovation, the Secondary 1 teacher was asked if she would ever try co-teaching with another colleague in her department. Her response, albeit spontaneous, was somewhat guarded:

Hmm, that I don't know. I mean I wouldn't mind if they proposed [it], but I don't know ... about the rest of the colleagues. ... Let's say if I'm close to this teacher and I think we have about the same ideas and we can throw ideas about, then I think yes, I think it is possible to come, sit down, plan an entire package together and consider going into a class together, where you take half of it, and I take half of it, yeah. Yes, it is possible.

These comments could be understood variously; they concurrently attest to the existence of interactions in the department based on weak, contingent peer-to-peer associations (see RQ #1 above) and also speak to the importance of working communally—discussing, learning together and testing possibilities at every opportunity (see below and Livingston, 2009).

As will be seen next, the results using CBAM profile data for the Secondary 3 teachers at the pre- and post-intervention stages of the study were somewhat different.
Su Heng's initial PCP

As seen in Figure 3,³ Su Heng had a number of high-level concerns prior to the commencement of the intervention that are typical of a non-or inexperienced technology user.

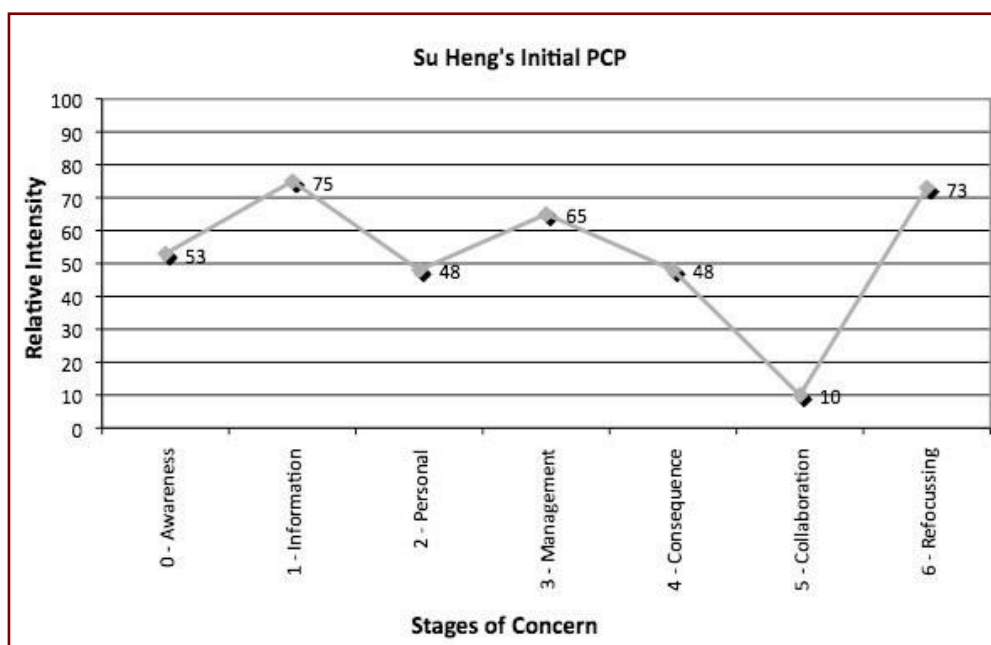


Figure 3. Su Heng's initial personalised concerns profile

Her highest concern (75th percentile) was at Stage 1, Information. Although she had heard (in workshops and from colleagues) that the laptops could help her students learn better, she seemingly lacked the necessary procedural knowledge and concrete practical experience to apply generalised notions about the benefits of technology to her subject specialism. As she explained in a pre-intervention interview:

What I see ... you know ... that in the abstract the technology should support you, all right? That there are a lot of things you can do with it, but what exactly are those things, how are they carried out, how are they done, right? That's a different thing altogether.

Nevertheless, Su Heng was comfortable with her present low technology, low complexity teaching style and remained to be convinced that there was a better way of meeting her immediate instructional needs. In this respect, her high concern (65th percentile) at Stage 3, Management, was related to the preparation of students for high-stakes pen-and-paper-based exams. Essentially, she was worried—based partly on feedback from colleagues—that her students' use of laptops could interfere with the flow and effectiveness of her teaching:

The other concern I have also is ... that sometimes ... you prepare a lesson that involves using the technology, and then you experience technical glitches. You know the projector doesn't work, the wireless is not connected, ... in the middle of a connection there's an interruption.

It is worth noting based on Hall, George and Rutherford (1979) that the tailing-up at Stage 6, Refocusing, in Su Heng's initial PCP (73rd percentile) signals a possible resistor—someone who may want to replace the innovation or knows of other approaches that (might) work better.

Kim Sim's initial PCP

Kim Sim's initial PCP (Figure 4) is marked by her intense concern at Stage 0, Awareness (84th percentile). This was due largely to a lack of technical and technological pedagogical knowledge (Mishra & Koehler, 2006) relating to the implementation of the laptop programme. But Kim Sim is not to be considered a typical non-user by this indicator alone (Hall, George, & Rutherford, 1979). In her case, the spike in Stage 3, Management, (69th percentile) suggests she was using the laptops but faced operational issues.

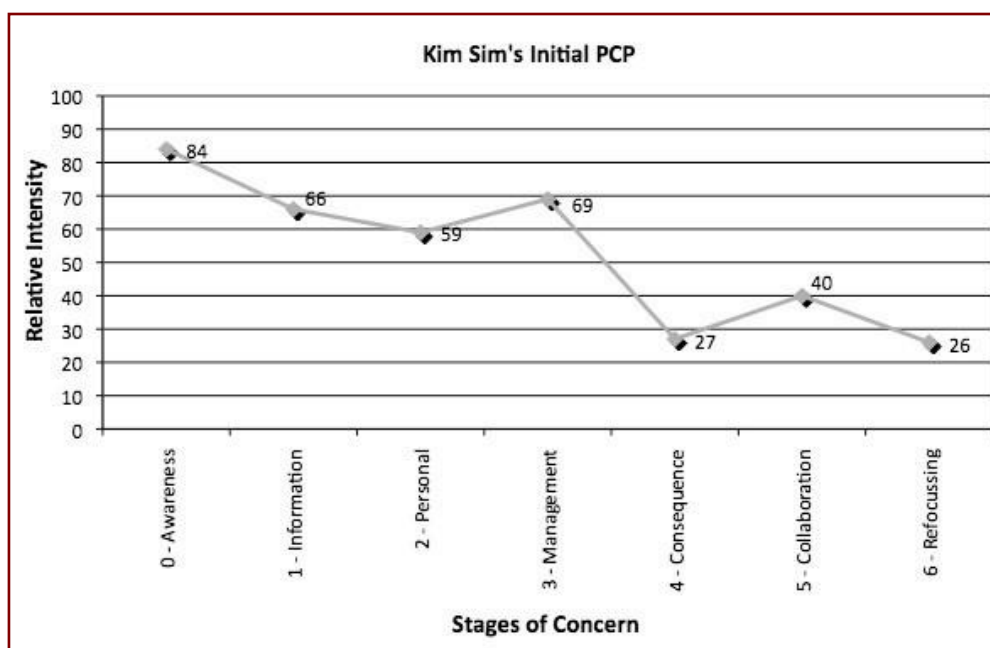


Figure 4. Kim Sim's initial personalised concerns profile

Kim Sim acknowledged the vast potential of laptops in a post-intervention interview, but preparing students for exams (where technology would not be present) was her overriding priority. Thus, finding a balance between the exams and the time needed to use the laptops was a challenge and a source of conflict given her students' perceived high reliance on their machines. Additionally, while she recognized the opportunity for laptopmediated differentiated learning, she worried that she had no idea about what her students were learning from the websites they visited. On reflection she considered she was better able to control classroom interactions when the laptops were not present or used. In her words:

The wealth of information and what you can [do] just go on and on, but we have to set that boundary, we have to stop somewhere. But the boys, of course, I'm sure if they want to, they can go on to, go and search and do so much more research on their own, yeah. There's so much, I mean, we are just covering the tip, and yet we are trying to do a lot with them. And then there is a time constraint because there are other areas that we must cover for the syllabus we are doing, you know.

The lowest score in Kim Sim's initial PCP, Stage 6, Refocusing (26th percentile) indicates that she was still learning how to make (effective) use of the laptops and did not know how or whether things could be done differently or better. Kim Sim felt, however, that if her primary intense concern were removed, her overall profile would look very different.

Su Heng's second PCP

Following the task design intervention, Su Heng believed she had a better sense of the general direction of FHS's laptop programme following the receipt of new information and her direct experiences in the classroom. As shown in Figure 5, the slight downward shift at Stage 1, Information (decrease from 75th percentile to 69th) can be explained by two connected factors: (i) a change in policy direction at the school level from the use of laptops as technological devices (for their own sake) to being conceived as tools to directly support and enable pedagogy and practices, and (ii) the need to know less about the purposes of the one-to-one laptop innovation. However, the level of intensity of this concern (Information) is still high because Su Heng realized she now had questions in new areas. In particular, she wondered how the school's redirection would influence her teaching (see Stage 2, Personal, increase to 70th percentile from 48th), classroom management (see Stage 3, Management, increase to 73rd percentile from 65th) and her students' learning (see Stage 4, Consequence, increase to 59th percentile from 48th).

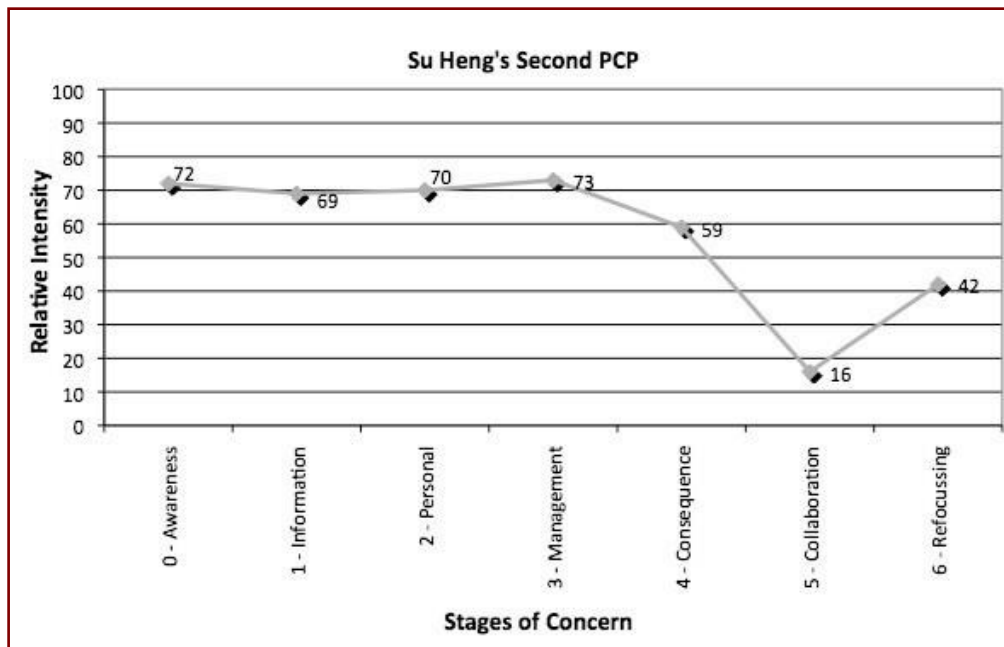


Figure 5. Su Heng's second personalised concerns profile

Interestingly, when comparing Figures 2 and 4, it is immediately apparent that the biggest difference in Su Heng's profiles is at Stage 6, Refocusing (decrease from 73rd percentile to 42nd). Notably, she was still somewhat guarded about examination preparation as she mentioned in a post-intervention interview:

I feel that in terms of learning ... the laptops are useful we have to always balance this with this big thing called the "O-Level" examination. And for some of the students, I feel that it is not beneficial because ... when we type and when we write ... we approach things differently. Writing is very linear. You have to think through everything, take up your pen and start writing. But when you're using the computer, it is more circular, you can go backward and forward ... you can change your mind and that is not a bad thing. In fact, I think it's a more natural way of writing but if you're doing that ... they are now more resistant to using pen and paper.

And when referring to the students' use of the World Wide Web, she reflected:

... when they are searching they are in control, right. I think that's the positive thing, okay. The negative thing, of course, is that there could be a fair amount of distraction when they are actually looking for information ... when you're using the MacBook, the approach is significantly different from the more traditional approach and yet we are using the traditional method to assess them.

Kim Sim's second PCP

As can be seen in Figure 6, Kim Sim's second profile is markedly different from her first. Importantly, the biggest change was at Stage 0, Awareness (decrease from 84th percentile to 29th) due mostly to her long experience in teaching and exposure to the one-to-one laptop programme, in particular. As reflected in drops in levels of intensity at Stages 1 and 2, Kim Sim noted that she had picked up a number of resources and workable ideas from colleagues, courses and students thus reducing her personal and information concerns.

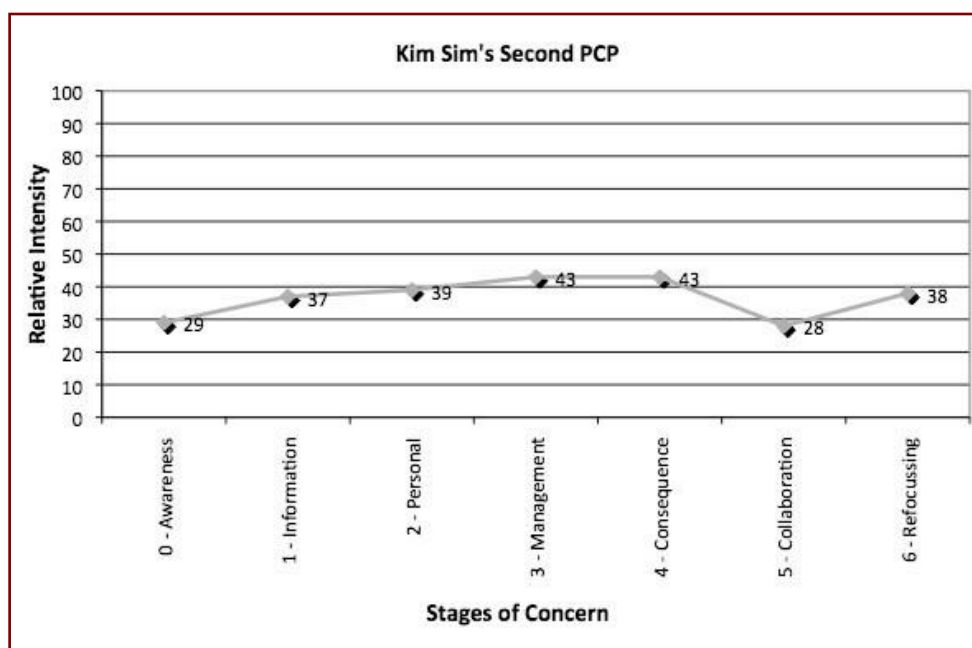


Figure 6. Kim Sim's second personalised concerns profile

The reduction at Stage 3, Management (decrease from 69th percentile to 43rd) requires some explanation. While Kim Sim shared Su Heng's concerns about balancing laptop use with pen-and-paper-based work, the reasons for her moderately-high management issues had changed. Whereas the detailed planning in the task design intervention in laptop-assisted situational writing required time, she considered it was worth the effort because she saw improvements in her students' work. The following extract taken from the post-intervention interview substantiates this point:

I think the laptops really helped because the students read, reviewed and understood what they were doing. And they had their peers to point things out and share with them. And you can see a lot of them in the exam doing the same; they picked it up. So, they remembered certain things they must and must not do. So, it's there, it's evident.

In addition, the co-planning helped Kim Sim manage her class better. There were clearer activities and explicit, measurable task outcomes that resulted in an increase at Stage 4, Consequence (from 27th percentile to 43rd). Essentially, she was better able to see how her students learnt which was encouraging. However, she also realized she now needed to design and enact a wider range of activities and offer different kinds of support to cater to her students' diversifying needs and interests. These circumstances presented a new (but positive) suite of on-going professional learning concerns that is also reflected at Stage 6, Refocussing (increase to 38th percentile from 26th).

There was one other notable and promising development in Kim Sim's professional learning journey. At Stage 5, Collaboration, there was greater self-assurance and camaraderie demonstrated in working with the laptops. As explained in the post-intervention interview:

... with more of this sharing everybody is less fearful. We're more confident and see that the laptop programme works. What works and what doesn't work. And then there is the interdepartment sharing and the support from the IT department, and all that. So I would think actually we are more willing and more comfortable sharing.

Above all, Kim Sim envisaged a leadership role for herself. As she became more interested and confident in effective laptop-mediated learning, she wanted to familiarize others with what she had learnt.

Finally, the unit of work exemplars were collated and printed in bound volumes and returned to the school for further action as deemed necessary.

Research question #5—In terms of one-to-one laptop use at the study school, what are the costs and benefits of teacher-student-researcher partnerships in ELLL professional development and learning?

By the end of the study it was clear from meetings conducted with teachers and school officers, the critical and reflective analysis of field notes, school visit logs, units of work produced and final evaluation reporting on site that the school's one-to-one laptop initiative was as ambitious as it was disruptive to the status quo. The teacher-researcher-student relationships that were attempted during the study highlighted numerous possibilities and tensions that can arise when the "tectonic plates" of teaching and learning in formal and informal contexts abut and collide. The following deliberations were made possible by the purposeful perturbation of the established modes of operation within the English department at FHS.

Teacher direction and learner independence

There can be little doubt that teacher input is necessary for instructional interactions to occur and this is particularly true when access to information, knowledge and social media are pivotal in decision-making concerning the time, location, topic, pace and pathways in learning. Yet, as shown in Figures 7a and 7b, the hypothesised association between (teacher) direction and (learner) independence is variable and vitally context-dependent. In formal situations, high levels of teacher direction and task framing tend to constrain and limit the scope and potential for independence (Figure 7a). The converse occurs when lower levels of teacher direction widen opportunities for learner independence to flourish, especially in informal contexts (Figure 7b).⁴

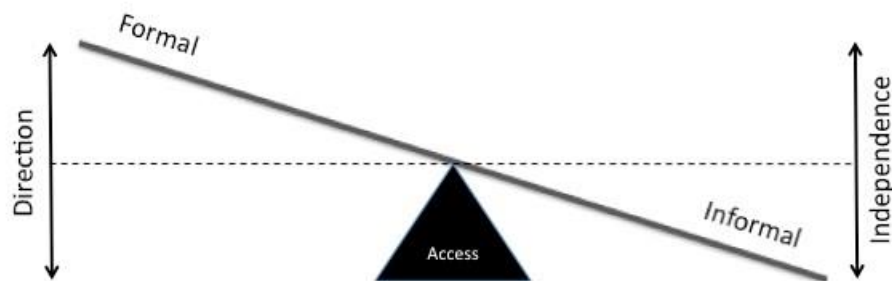


Figure 7a. High levels of teacher direction in formal learning constrain learner independence



Figure 7b. Low levels of teacher direction widen opportunities for learner independence in informal contexts

If this conceptualisation proves to be correct, then there are serious and pedagogically challenging implications for the ways in which school-based laptop ownership programmes in English language learning are designed, implemented and evaluated. Prototypically, two distinctive technology and new media scenarios are made possible and juxtaposed by wide access to media and information: (i) tightly framed, teacher-centred

schoolwork, and (ii) more open and flexible informal usage. However, there is a doublepronged sting-in-the-tail, here. First, as learners become highly proficient independent operators, disparities between what they are exposed to with technology outside of school and what they are allowed to say and do within it widen. The unfortunate consequence is that technologically adept and knowledgeable students could become bored and possibly *enraged* by schoolwork that does not acknowledge or extend their capabilities, interests and dispositions (see Prensky, 2006, Tapscott, 2009 for substantiation of this outcome).

Second, in an effort to maintain authoritative control over knowledge and learning, some teachers in one-to-one laptop learning contexts resort to assigning out-of-school tasks (e.g. homework) that only require the rudimentary and/or perfunctory use of technology. Such tasks might include word-processing, making wordy electronic slideshows or gleaning factual information from specified Websites. As functional as these assignments may be, they do not easily allow students to exercise significant pedagogical agency.

Therefore, if teachers (and students) are to realise the benefits of contemporary technology to bring about sustained, equitable and challenging academic work in one-to-one laptop contexts, then they will have to face up to the inevitable reality—however disruptive it is—that ubiquitous IT alters the axes of positional and epistemic authority in teaching towards other sources including students and new media. Following Covey (2004) teachers might contest that their concerns (e.g., lack of time and technical skilling) outweigh their ability to change working practices. However, teachers under these circumstances could become more effective if they focussed their attention on the things they can do something about within their immediate and personal circles of influence.

The evidence collected in the present study suggests that teacher professional development and learning can progress well when individual concerns are recognised and addressed, *in situ*. However, it must be acknowledged that customised professional learning—whether supported or initiated by researchers or not—is costly in terms of the time and effort required to plan, implement and monitor the work done. For example, the researchers found the actual production of complete units of work to be, at times, a slow and painstaking process and it is fair to conclude that the research design and the school's oneto-one laptop professional learning programme (including its deployment of protected time) did not go far enough in building up teachers' capabilities to stretch pupils critically and creatively. So, what would be required to make better capital out of teacher-studentresearcher partnerships in ELLL?

Collective action

Issues relating to what can be done to expand views of one-to-one laptop learning are vexing but they not intractable. One avenue of exploration would be to wait for the benefits of professional development programmes in computer skilling and methodology to mature over time. But the flaw in this strategy is not that it takes time, but rather that it portrays teachers as poor, individual performers whose levels of competence can be improved through standardised and standardising professional development activities.

An alternative approach to one-to-one laptop professional learning goes beyond the realm of an individual's action. Based on a paradigm from Boreham's (2004) competence is not considered exclusively as an attribute of individuals. Instead it is equally a matter of collective action involving making communal sense of workplace events, developing and using a collective knowledge base and developing interdependency through cooperation and communication.

If accepted, the notion of collective competence requires space for collective responsibility and mutual support for changes in workplace practices to occur (cf. Kennedy, 2005). This, it is contended, is only viable within an even broader framework of organisational learning. Data from the present study intimate the urgent need, therefore, for the operation of a theory of action relating to one-to-one laptop learning that runs at the

levels of the school, department or departmental sub-group. Elmore (2006) explains that a theory of action is a set of logically connected statements that link the actions of leaders to collective members of organisations to bring about improved practices. Crucially, school theories of action help colleagues understand *what* they are aiming to achieve and articulate *why* this is important to themselves, through dialogue, and their students through explicit lesson objectives and rationales for learning.

Working towards collective action is not a novel proposition but its application to English language one-to-one laptop programmes opens up some potentially fertile territory. Importantly, it is suggested that one-to-one laptop learning is not solely an issue of individual competence. Seen from a wider, collective perspective, support for pedagogical change would seem to require strong, insightful and consistent leadership (not management exclusively), and knowing how to embrace complexity and foster diversity. Furthermore and most importantly, the development of teachers' one-to-one laptop capabilities involves understanding *how* learning occurs in professional spheres of practice both formally and informally and allowing teachers' interactions to happen freely in these arenas (see Fraser, Kennedy, Reid, & McKinney, 2007).

Another possibility would be for small groups of teachers at FHS to create and operate within what Gee (2004) calls "affinity spaces" that allow them to transition from a collection of like-minded individuals towards a coalescence based around mutually benefiting interactions. According to Gee, affinity spaces—commonly associated with on-line gaming groups—are composed of three elements and are characterised by several distinctive features: (i) content, (ii) a portal (e.g. places where interactions can occur: staffroom, corridors, canteens) and (iii) a generator that can organise, for example, content (e.g. a curriculum and the need to produce learning materials to support it).

Briefly, in terms of defining features, affinity groups:

- Have common interests, goals and practices that are not based on race, gender, age or social class;
- Are not segregated based on levels of expertise;
- Collaborate in the development of specialised knowledge and shared this extensively with others;
- Acknowledge and build each other's tacit knowledge; and importantly,
- Have no assigned leader. (Gee, 2004, pp. 85-87)

Gee mentions that traditional school classrooms are not suited to affinity space interactions because of the status afforded to teachers and the set curriculum as sources of unquestioned authoritative knowledge. However, given sufficient support and motivation, there would seem to be no compelling pedagogical reason why teachers could not bootstrap their own learning and provide leadership to their colleagues in ways that are peaceful and meaningful but not necessarily status-laden.

If the proposal for affinity spaces is accepted, then school administrators and managers would do well to give as much time and space as possible to teachers and students to mix, match and discuss their work wherever and whenever they can. They also then need to implement their plans faithfully and consistently. English teachers' pedagogic conversation, in particular, can be learnt, practiced and highly productive. It should also be seriously considered as an essential mark of inquiring, futures-oriented one-to-one laptop language educators who can mentor each other on a peer-to-peer basis.

CONCLUSION AND RECOMMENDATIONS

The findings showed that one-to-one laptop English language and literature teaching and learning practices did not equate easily to the school's strategic plans and national

policies relating to the use of digital tools and new media. If accepted, the following recommendations are made for future implementation.

A different way of working is required that acknowledges, addresses and maps the inevitable shift of positional and epistemic authority, and technological expertise towards students, especially, in one-to-one laptop learning. The available evidence suggests that positive pedagogical change in one-to-one laptop language learning is realisable given two interrelated conditions. First, teachers need to know how learner independence that is crucially mediated by technology, and teacher-direction relate to each other in practical terms. Second (and not wishing to make light of the difficulties associated with classroom management) teachers need to recognise and respond positively to the ever-increasing reality that they no longer occupy the roles of sole source and arbiter of knowledge in the classroom that they once did when print-based and analogue resources ruled the day. Technology, it would seem, is no respecter of traditional positional and epistemic authority, and unquestioned or unquestionable procedures.

Teachers have to work in subject and level specific professional learning communities that have the deliberate use of laptops as a primary concern. They also need to confer with and coordinate their curriculum, assessment and pedagogical intentions with administrative and managerial colleagues. The purpose being to understand collectively what they are aiming to achieve in and through subject and level specific curriculum maps and articulate why this is important to students, in particular. English teachers' pedagogic conversations should be seriously considered as a new defining mark of inquiring, futures-oriented, one-to-one laptop language educators.

Teachers are not totally bereft of agency in one-to-one laptop learning contexts even though the epistemic ground has shifted irremediably around them. They can show leadership at their level in two ways by: (i) partnering (not battling against) students in task design—that is, allowing them to make decisions about how work is completed and assessed, and (ii) working collectively with colleagues drawing on commonalities and affinities that may go beyond (but certainly not circumvent) overt school-based structures. This second notion is at first sight unconventional and far-reaching because it challenges accepted (and largely unquestioned) notions of where expertise is located in schools. However, if students can create and operate in non-hierarchical affinity spaces, then teachers should be prepared to demonstrate that they can do likewise with positive results.

School administrators and managers need to give as much time and space as possible for teachers and students to mix, match and discuss their work openly and implement agreed plans with fidelity to principled pedagogical action that is consistent with 21st Century ideals and requirements. What are now required are clear aims and purposes related to the one-to-one laptop initiative in the school. These would include a variety of observable practices for teachers and students that can guide future policy implementations.

It is recognised that the research encountered a number of limitations that may have impacted on the type and quality of findings produced. These items can be organised into three main categories: (i) the definition of key terms; (ii) the need to understand the school context; and (iii) research implementation.

First, some initial definitions of the meanings associated with the lexicon within this research may have enabled a clearer understanding of its processes and expectations. For example, technology, multi-modality and even research could have been interpreted in different ways by the various people involved.

As the study progressed, it became apparent to the researchers through conversations with teachers and the school's management that the exploratory and collaborative methodology featured in the proposed research design was very far distant

from the espoused beliefs and expectations of all those involved in the one-to-one laptop innovation. It is therefore acknowledged that a different set of findings may have resulted if the research design included (and perhaps started from) the collection of quantitative data sets such as, students' test scores on continuous and summative assessments. These data could have then provided a baseline for considering how the introduction of technology into the curriculum might provide a means to move away from the design and delivery of contentbased assessment tasks.

Third, while there was a desire to make a success of the one-to-one laptop initiative and given the multiple opportunities made available to meet with school managers and teachers (either in groups or individually) there was still a need for more extensive relationships to be forged with all parties concerned. To achieve the school's objectives it is suggested that research activity (and participation in it) has to be recognised as an integral component of teaching practice as opposed to something that is seen as an additional burden.

To end. One positive and productive way to measure the implementation of the one-to-one laptop programme in the study school, to understand its underlying philosophy and plan, modify and/or change current practices, is to produce a range of configurations (akin to stages or benchmarks of development) for both teachers and students that are possible within and through the innovation (cf. Hord, Stiegelbauer, Hall, & George, 2006). Following Hord *et al.* (2006) and based on data collected, documents read and discussions with teacher-partners, Appendix E is a tool for the school, teachers and students to use in their on-going professional development and learning, and self-reflection. The suggested actions (which can and should be modified over time as more is known about the innovation) maps four areas for teachers (use of laptops, the planning of instructional strategies, relationships with students, and the use of technical support) and three areas for students (use of laptops, access to laptops and engagement in learning activities).

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NOTES

1. This is a pseudonym.
2. A small number of students opted out of the one-to-one laptop programme in its first and second years of operation.
3. The x-axis (horizontal) represents the seven stages of concern starting from Stage 0 (extreme left) to Stage 6 (extreme right). The y-axis (vertical) represents the percentile range of the concerns' intensity from 1 to 99 (for interval line consistency, the highest point of the y-axis terminates at 100). The seven numerals on the graph are percentile scores denote the participants' concern levels across all the stages.
4. We are indebted to Dr. Hayo Reinders for his assistance in conceptualising the relationships shown in Figures 7a and 7b.

REFERENCES

- Ajayi, L. (2009). English as a second language learners' exploration of multimodal texts in a junior high school. *Journal of Adolescent & Adult Literacy*, 52(7), 585-595.
- Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher*, 32(1), 21-24.
- Boreham, N. (2004). A theory of collective competence: Challenging the neo-liberal individualisation of performance at work. *British Journal of Educational Studies*, 52(1), 5-17.
- Brooks-Young, S. (2010). *Teaching with the tools kids really use: Learning with web and mobile technologies*. Thousand Oaks, CA: Corwin.
- Burns, K., & Polman, J. (2006). The impact of ubiquitous wireless computers in the internet age: How middle school teachers adapted to the technology in the initial stages of implementation. *Journal of Technology and Teacher Education*, 14(2), 363-385.
- Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher*, 32(1), 9-13.
- Covey, S. R. (2004). *The 7 habits of highly effective people: Restoring the character ethic (revised edition)*. New York: Free Press.
- Cresswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.
- Donovan, L., & Green, T. (2010). One-to-one computing in teacher education: Faculty concerns and implications for teacher educators. *Journal of Digital Learning in Teacher Education*, 26(4), 140-148.
- Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education*, 39(3), 263-286.
- Dunleavy, M., Dexter, S., & Heinecke, W. F. (2007). What added value does a one-to-one student to laptop ratio bring to technology supported teaching and learning? *Journal of Computer Assisted Learning*, 23(5), 440-452.
- Elmore, R. F. (2006). *Leadership as the practice of improvement (preliminary draft)*. Paper presented at the International Conference on International Perspectives on School Leadership for Systematic Improvement, HSBC Headquarters, London.
- Fraser, C., Kennedy, A., Reid, L., & McKinney, S. (2007). Teachers' continuing professional development: Contested concepts, understandings and models. *Journal of In-service education*, 33(2), 153-169.
- Freebody, P. R. (2003). *Qualitative research in education: Interaction and practice*. London: Sage.
- Garthwaite, A., & Weller, H. G. (2005). A year in the life: Two seventh grade teachers implement one-to-one computing. *Journal of Research on Technology in Education*, 37(4), 361-377.

- Gee, J. P. (2004). *Situated language and learning: A critique of traditional schooling*. New York: Routledge.
- Hall, G. E., George, A. A., & Rutherford, W. L. (1979). Measuring stages of concern about the innovation: A manual for use of the SoC questionnaire (2nd ed.): Research and Development Center For Teacher Education, University of Texas at Austin.
- Hall, G. E., & Hord, S. M. (2006). *Implementing change: Patterns, principles, and potholes*. Boston: Allyn and Bacon.
- Hall, G. E., Wallace, R. C., & Dosset, W. A. (1973). *A developmental conceptualization of the adoption process with educational institutions*. Austin, Texas: The University of Texas.
- Hitchcock, G., & Hughes, D. (1995). *Research and the teacher: A qualitative introduction to school-based research* (2nd ed.). London and New York: Routledge.
- Holcomb, L. B. (2009). Results & lessons learned from one-to-one laptop initiatives: A collective review. *TechTrends*, 53(6), 49-55.
- Hord, S., Rutherford, W., Huling-Austin, L. and Hall, G. (1987). *Taking Charge of Change*. Association for Supervision and Curriculum Development. University of Texas, Austin: U.S.A.
- Hord, S. M., Stiegelbauer, S. M., Hall, G. E., & George, A. A. (2006). *Measuring implementation in schools: Innovation configurations*. Austin, TX: Southwest Educational Development Laboratory.
- Infocomm Development Authority (IDA), Singapore (2006). *Empowering learners and engaging minds, through infocomm. Report by the iN2015 Education and Learning Sub-Committee*. Retrieved, 26 March, 2009, from http://www.ida.gov.sg/doc/About%20us/About_Us_Level2/20071005103551/03_Education_and_Learning.pdf
- Infocomm Development Authority (IDA), Singapore (2008). *FutureSchools@Singapore*. Retrieved, 11 September, 2010, from http://www.ida.gov.sg/doc/Programmes/Programmes_Level2/20090513123701/FutureSchools.pdf
- Jewitt, C. (2008). Multimodality and literacy in school classrooms. *Review of Research in Education*, 32, 241-267.
- Jewitt, C., & Kress, G. (Eds.) (2003). *Multimodal literacy*. New York: Peter Lang.
- Jukes, I., McCain, T., & Crockett, L. (2010). *Understanding the digital generation: Teaching and learning in the new digital landscape*. Kelowna, BC: Corwin.
- Kennedy, A. (2005). Models of continuing professional development: A framework for analysis. *Journal of In-service education*, 31(2), 235-250.
- Khambari, M. N. M., Moses, P., & Wong, S. L. (2009). Laptop ownership and use among educators: Reflections from school teachers in Malaysia. *International Journal of Instruction*, 2(2), 47-72.

- Kramer-Dahl, A. (2008). Negotiating what counts as English language teaching: Official curriculum and its enactment in two Singaporean secondary classrooms. *Research Papers in Education*, 23(1), 85-107.
- Kress, G., & van Leeuwen, T. (2001). *Multimodal discourse: The modes and media of contemporary communication*. London: Arnold.
- Kress, G., Jewitt, C., Bourne, J., Franks, A., Hardcastle, J., Jones, K., et al. (2005). *English in urban classrooms: A multimodal perspective on teaching and learning*. London: Routledge Falmer.
- Lee, K. Y. (1998). *The Singapore story: Memoirs of Lee Kuan Yew*. Singapore: Times Editions and Singapore Press Holdings.
- Livingston, P. (2009). *1-to-1 learning: Laptop programs that work* (2nd ed.). Washington, DC: International Society of Technology in Education.
- McGrail, E. (2006). "It's a double-edged sword, this technology business": Secondary English teachers' perspectives on a schoolwide laptop technology initiative. *Teachers College Record*, 108(6), 1055-1079.
- McGrail, E. (2007). Challenges to teacher control in the English laptop classroom. *Georgia Educational Researcher*, 5(1), 1-19.
- McKinnon, D. H., & Nolan, P. C. J. (1989). Using computers in education: A concerns-based approach to professional development for teachers. *Australian Journal of Educational Technology*, 5(2), 113-131.
- Media Development Authority, Singapore (2008). News Release: IDM R&D Programme Office to champion R&D (10 October 2006). Retrieved, November 7, 2008, from <http://www.mda.gov.sg/wms.www.thenewsdesk.aspx?sid=746>
- Ministry of Education, Singapore (2009). Desired outcomes of Education. Retrieved, March 26, 2009, from <http://www.moe.gov.sg/education/desired-outcomes/>
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Moersch, C. (1995). Levels of technology implementation (LoTi): A framework for measuring classroom technology use. *Learning and Leading with Technology*, 23(4), 40-42.
- Mouza, C., Cavalier, A., & Nadolny, L. (2008). Implementation and outcomes of a laptop initiative in career and technical high school education. *Journal of Educational Computing Research*, 38(4), 411-452.
- Newhouse, P. (1999). Examining how teachers adjust to the availability of portable computers. *Australian Journal of Educational Technology*, 15(2), 148-166.
- Ministry of Education, Singapore (2001). *English language syllabus 2001 for primary and secondary schools*. Curriculum Planning and Development Division. Singapore: Author. Downloaded, March 1, 2010, from: <http://www.moe.gov.sg/education/syllabuses/languages-and-literature/files/englishprimary-secondary.pdf>
- Ministry of Education, Singapore (2010). *English language syllabus 2010, primary & secondary (express / normal [academic])*. Curriculum Planning and Development

Division. Singapore: Author. Downloaded, August 26, 2010, from:
<http://www.moe.gov.sg/education/syllabuses/languages-and-literature/files/englishprimary-secondary-express-normal-academic.pdf>

- Ng, E. H. (2008). Opening Address at the International Conference on Teaching and Learning with Technology (iCTLT) at the Suntec Convention Hall, Singapore, on Tuesday, 5 August 2008 Retrieved, March 16, 2009, from <http://www.moe.gov.sg/media/speeches/2008/08/05/opening-address-by-dr-ng-engh-1.php>.
- Owen, A., Farsaii, S., Knezek, G., & Christensen, R. (2006). Teaching in the one-to-one classroom: It's not about laptops, it's about empowerment! *Learning and Leading with Technology*, 33(4), 12-16.
- Prensky, M. (2006). *"Don't bother me Mom, I'm learning!" How computer and video games are preparing your kids for twenty-first century success and how you can help!* . St. Paul, Minn: Paragon House.
- Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, California: Corwin.
- Roth, W.-M., & Tobin, K. (2002). *At the elbow of another: Learning to teach by coteaching*. New York: Peter Lang.
- Rutledge, D., Duran, J., & Carroll-Miranda, J. (2007). Three years of the New Mexico laptop learning initiative (NMLLI): Stumbling toward innovation. *AACE Journal*, 15(4), 339366.
- Sandholtz, J. M., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms*. New York: Teachers College Press.
- Sclater, J., Sicoly, F., Abrami, P. C., & Wade, C. A. (2006). Ubiquitous technology integration in Canadian public schools: Year one study. *Canadian Journal of Learning and Technology*, 32(1).
- Tapscott, D. (2009). *Grown up digital: How the net generation is changing your world*. New York: McGraw Hill.
- Towndrow, P. A., & Vaish, V. (2009a). Wireless laptops in English classrooms: A SWOT analysis from Singapore. *Educational Media International*, 46(3), 207-221.
- Towndrow, P. A., & Vaish, V., (with Wan Fareed Bin Mohammed Yusof) (2009). *Enhancing criticality: A pilot project with Interactive Digital Media (IDM) as pedagogical amplifiers in English classes at secondary level*. Singapore: Nanyang Technological University, National Institute of Education, Learning Sciences Laboratory.
- Wang, R. (2010, 4 October 2010). Why integrating MacBooks into the school curriculum ain't the best idea. <http://www.techxav.com/2010/04/15/mac-school-curriculum/>
- Warschauer, M. (2006). *Laptops and literacy: Learning in the wireless classroom*. New York: Teachers College Press.
- Zehr, M. A. (2000). Laptops for all doesn't mean they're always used. *Education Week*, 19(39).

APPENDIX A. Digital storytelling rubric (adapted from
<http://www.umass.edu/wmwp/DigitalStorytelling/Rubric%20Assessment.htm>)

CATEGORY	10-9	8-7	6-5	4-0	Sub-total
Theme/ Point of View	Establishes a theme/purpose early on and maintains a clear focus throughout.	Establishes a theme early on and maintains focus for most of the presentation.	There are a few lapses in focus, but the theme/purpose is fairly clear.	It is difficult to figure out the theme/purpose for the presentation.	
Content	The story is very interesting and unique with a wide usage of emotional content that adds depth and meaning that connect with the audience.	The story is quite interesting and somewhat unique with some usage of emotional content that adds depth and meaning that connect with the audience	The story is not really interesting and rather common but there are a few traces of usage of emotional content that add depth and meaning that connect with the audience.	The story is very dull and boring, with no depth and no usage of emotional content that add depth and meaning which connect with the audience.	
Economy	The story is told with exactly the right amount of detail throughout. It does not seem too short nor does it seem too long. (Between 3-5 mins)	The story composition is typically good, though it seems to drag somewhat OR needs slightly more detail in one or two sections. (Between 3-5 mins)	The story seems to need more editing. It is noticeably too long or too short in more than one section. (A few seconds more than 5 mins or a few seconds less than 3 mins)	The story needs extensive editing. It is too long or too short. (Less than 2.30 mins or more than 5.30 mins)	
Grammar	Grammar and usage were correct and contributed to clarity, style and character development.	Grammar and usage were typically correct and errors did not detract from the story.	Grammar and usage were typically correct but errors detracted from the story.	Repeated errors in grammar and usage distracted greatly from the story.	
CATEGORY	20-18	17-15	14-10	9-0	Sub-total
Voice—Register & Expressiveness (Voice Modulation, Voice Punctuation & Rhythm)	The register, voice modulation, voice punctuation and rhythm fit the story line and help the audience “get	Occasionally speaks too fast or too slow for the story line. The voice modulation, voice punctuation	Tries to use voice modulation, rhythm and voice punctuation but it is often noticeable that they do not fit	No or very little attempt to match the register, voice modulation, voice punctuation and rhythm of the storytelling to the story line. Audience is not	

	into" the story. The register is appropriate.	and rhythm are relatively engaging for the audience. The register is appropriate.	the story line. Audience is not engaged. The register is appropriate at times.	engaged. The story is told in monotone. The register is largely inappropriate.	
Voice— Fluency/Articulation & Pronunciation	The story is mostly told in very fluent, very clearly articulated and very accurately pronounced English.	The story is mostly told in fluent, clearly articulated and accurately pronounced English.	The story is told in somewhat fluent English with some mistakes in articulation and pronunciation.	The story is told in staccato English and quite a few glaring articulation and pronunciation errors.	
CATEGORY	20-18	17-15	14-10	9-0	Sub-total
IT Usage—Images & Sound Track	Images and sound track create a distinct atmosphere or tone that matches different parts of the story well.	Images and sound track create an atmosphere or tone that matches some parts of the story well.	An attempt was made to use images and sound track to create an atmosphere/tone but it needed more work. Image choice is logical.	Little or no attempt to use images or sound track to create an appropriate atmosphere/tone.	

TOTAL SCORE: _____/100

APPENDIX B. Co-generated Secondary 1 Unit of Work Summary Coversheet

Title	Summary Writing
Level	Secondary 1 (Express)
Enduring Understandings	Students will understand that: - To be effective, the (summary) writing process must lead to a sufficiently coherent body of ideas to address the specific needs of an intended audience and - The (summary) writing process is a helpful and necessary tool in constructing and demonstrating the meaning and importance of specific content.
Essential Questions	- How is summary writing used in the wider world? - What are the key ideas or concepts in a written text? How do we decide what is relevant and what is not when we are selecting key ideas for summary? - How can we use IT to overcome the problems faced by summary writing? - What is the difference between summarizing and paraphrasing? - What are the consequences of plagiarism?
Knowledge	- Students should know what is meant by purpose and audience - Students should know how to identify the focus of a summary question and how to identify the key ideas in the passage - Students should know how to paraphrase materials without changing the meaning of the original text.
Skills	- Develop a summary writing strategy that suits their learning style - Distinguish between relevant and non-relevant information - Develop strategies for widening their vocabulary (using IT, dITionaries, thesaurus etc) - Students should be able to work independently and cooperatively with others - By presenting to others, students should be able to develop their confidence as speakers.

APPENDIX C. Co-generated Secondary 3 Lesson Plan in Situational Writing

Lesson No.	Learning Objectives	Tasks/Activities	Resources (Including texts and ICT)	Assessment	Link to Previous/Next Lesson	Remarks
1.	LO3 - Plan and present information for a specific purpose. LO3 - Generate and select ideas for writing and representing for a variety of purposes, audiences, contexts and culture.	Starter activities 10 mins Teacher led class discussion of the nature and purpose of the task – (Whole class). Development activities 10 mins Introduction of Google Sites: Student leaders (who have received prior training) will lead - (Group work). 20 mins Task allocation ○ Teacher led discussion of the task in relation to purpose and audience – (Whole class). ○ Assignment of task to specific groups – (Two groups will work on each of the options provided in the task sheet). 20 mins Students to brainstorm for ideas to fulfill requirement of the assigned task – (Group work) Plenary activities 10 mins ○ Teacher led review of what students have learnt in the lesson.	○ 21st century classroom (or a similar location where students have online access and can work comfortably in groups) ○ Macbooks ○ Internet ○ Google Sites grouping information and access ○ Task sheet ○ Macbooks ○ Internet	○ Peer assessment ○ Teacher assessment	None None None Inform students of what they need to know/complete	

		Selected group will be given 2 minutes for presentation. (Whole class and group work)			for the next lesson	
2.	LO4: Use appropriate skills, strategies and language to construct meaning during interactions.	Starter activities 10 mins Teacher led discussion of the task for the day - (Whole class). Development activities 50 mins Students work in their groups to collaboratively produce the first draft of the text. Upload the completed piece to Google Sites for publication - (Group work). Plenary activities 10 mins Teacher led review of the dynamics involved in collaborative writing – (Whole class).	21st Century Classroom (or a similar location where students have online access and can work comfortably in groups) - MacBooks - Google Sites - Internet - Task Sheet	- Self assessment - Peer assessment - Teacher assessment		
3.	LO4: Use appropriate skills, strategies and language to construct meaning during interactions.	Starter activities 10 mins - Teacher led discussion of expectations regarding Google Sites publication(s). - Introduction of rubrics and its applications. - Review of need for assessment and appropriate attitude towards	21st Century Classroom (or a similar location where students have online access and can work comfortably in groups) - Rubric (see pg 14)	- Self assessment - Peer assessment - Teacher assessment		

		criticisms given. (Whole class) Development activities 15 mins Peer assessment – (Group work) 35 mins Review, revise and edit – (Group work) Plenary activities 10 mins ○ Teacher led review of the application of the rubrics ○ Students' assessment of the usefulness of critical examination of another text.	○ Macbooks ○ Internet ○ Google Sites			
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APPENDIX D. Situational Writing Task Sheet for Secondary Three Students**Section Two [30 marks]**

Begin your answer on a fresh page.

You are advised to write between 250 and 350 words for this part.

You should read the information carefully and plan your answer before beginning to write.

Due to popular demand, your school principal has decided to open **one** more food stall in your school canteen. Three stall vendors have expressed their interest. The student councillors have come up with an information sheet containing the details of these stalls.

As the class chairman, you have been asked to get feedback from your classmates on the stall of their choice.

The European Connection

- Western food at affordable prices
- A new concept
- Provides more varieties for students
- Set meals range from \$2.50 to \$3.50

Madam Saleha Nasi Padang

- Selling rice with accompanying dishes
- More variety in terms of dishes sold
- Stall does not have the “Healthier Option” sticker yet
- Fixed combination of rice plus two dishes at \$2.50 or rice plus three dishes at \$3.00

Sonny’s Snack Stall

- Sells grab-and-go food such as sandwiches, traditional kuehs and fruits
- Stall has the “Healthier Option” sticker
- First stall in the canteen to sell such food
- All items sell for less than \$1.50

Write a report to the Principal, in **clear accurate English**, explaining in detail the reasons for the class’ choice so as to **convince** the Principal that the stall selected will **best meet the dietary needs** of the students.

APPENDIX E. Draft Innovation Configurations Maps for Teachers and Students in the One to One Laptop Programme

Draft Innovation Configuration Map for the one-to-one laptop programme (Teachers)

Component 1: Teachers' use laptops			
Teachers frequently use laptops for teaching and administrative purposes in a variety of ways. Teachers make full use of the laptops' functionality and explore ways to enhance their teaching, improve students learning and increase productivity in terms of administrative tasks. Teachers also experiment and try new strategies as afforded by the laptops.	Teachers frequently use laptops for teaching and/or administrative purposes in the same, unvaried ways. Occasionally, teachers explore the laptop's functionality to enhance their teaching, students learning and increase productivity in terms of administrative tasks. The uses of laptops are sometimes just as an alternative to the traditional ways of teaching.	Teachers occasionally use laptops for teaching and/or administrative purposes in the same, limited ways. Teachers use the laptops as add-ons, or 're-tool' their strategies for the sake of using the laptops.	Teachers rarely or never use laptops. Most of the time, they use the traditional ways of teaching. Teachers use the laptops mainly as a mode of lesson delivery via screen projection.
Component 2: Teachers' planning of instructional strategies			
Teachers adopt a student-centric approach in delivering lessons and planning activities with the laptops. Teachers inform students of the learning objectives, marking scheme and tasks involved. Teachers include authentic tasks for students to work on as individuals and in groups.	Teachers adopt a combination of whole class lecture style and student-centric approaches with the laptops. Teachers consciously attempt to inform students of the learning objectives, marking scheme and tasks involved. Teachers attempt to include authentic tasks where possible. Teachers assign groups and prescribe the technological tools to use.	Teachers adopt mostly whole class lecture style. Teachers do not include uses of the laptops in the planning of activities. Teachers tend to skip informing students of the learning objectives, marking scheme and tasks involved. Teachers employ traditional ways of teaching and rely solely on printbased/written texts.	

Teachers make use of a variety of digital/multimodal resources.	Teachers rely heavily on text and occasionally use other modes of resources.		
Teachers facilitate discussions, provide scaffolding, and individualised attention via laptops or traditional ways where appropriate.	Teachers provide general scaffolding and feedback to the whole class and only occasionally to groups/individuals primarily via traditional ways.	Teachers provide general scaffolding and feedback to the whole class solely via traditional ways.	
Teachers allow students to choose any technological tool for their tasks.		Teachers do not allow students to use laptops most of the time.	
Component 3: Teachers' relationships with students			
Teachers take on various roles interchangeably. They facilitate and guide the learning process.	Teachers often lecture to the whole class and only occasionally facilitate the learning process.	Teachers adopt direct instruction and a lecture-type approach.	
Teachers also participate and colearn with students.	Teachers rarely participate in activities together with students.	Teachers prescribe all tasks. Teachers rarely give students the opportunity to explore and experiment.	
Teachers encourage students to query and seek clarification on knowledge acquired via individual research/group discussions to those presented by teachers or textbooks. Teachers do not hold the authoritative knowledge status.	Teachers allow students to query and seek clarification but largely still hold the authoritative knowledge status.	Although teachers allow students to query and seek clarification, communication is often one-way (teachers downloading information). Teachers hold the authoritative knowledge status.	
Component 4: Teachers' use of technical support			
Teachers pre-empt and seek technical support when necessary before and during lessons.	Teachers seek technical support only when faced with technical issues.	Teachers do not seek technical support at all.	
Teachers pick up	Teachers may or may	Teachers tend to	

essential skills and knowledge that are relevant to them from technical support personnel.	not pick up essential skills and knowledge that are relevant to them from technical support personnel.	abandon/avoid activities using technology.	
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Draft Innovation Configuration Map for the one-to-one laptop programme (Students)

Component 1: Students' use laptops			
Students use laptops for their learning activities in variety of ways that aid in their understanding of the topic either individually or in groups. Students make their own decisions about the tools to use that support their learning styles and for other educational related purposes. Students also use laptops for administrative purposes such as organising information and connecting to the projector for presentation.	Students use laptops for their learning activities as instructed and prescribed by teachers. Occasionally students explore and make their own decisions about the tools to use that support their learning styles and for other educational related (and administrative) purposes.	Students use laptops for limited purposes such as searching for information via the Internet and as a production tool only when instructed. Students do not explore or use laptops' functionalities or other software that is available to aid in their learning or for other educational related (and administrative) purposes.	Students rarely or never use laptops. Students use laptops for noneducational purposes such as playing games and watching movies.
Component 2: Students' access to laptops			
Students bring and access laptops in school everyday. Students use laptops to access resources via wireless broadband and for other school related tasks.	Students bring and access laptops in school only when they need to use them or when instructed by teachers. Students occasionally use laptops to access resources via wireless broadband and for other school related tasks.	Students bring and access laptops in school only when instructed by teachers. Students use laptops to access resources via wireless broadband and for other school related tasks only when instructed.	Students rarely or do not bring and access laptops in school even when instructed by teachers. Students rarely use laptops to access resources via wireless broadband and for other school related tasks.

Component 3: Students' engagement in learning activities

Students engage in higher order thinking, deep learning and meaning making via a combination of several activities using various modes of communication channels and technology tools.	Students occasionally engage in higher order thinking, deep learning and meaning making via a combination of several or only one activity. Other times students simply receive information downloaded by teachers. Students use technology as prescribed by teachers.	Students simply receive information downloaded from teachers most of the time. Students rarely engage in higher order thinking, experimentation, research work or discussion.	
Students provide feedback to peers and make use of feedback from peers and teachers through these communication channels.	Students provide feedback to peers typically via traditional classroom formats. Students usually take note and make use of the feedback.	There is little feedback from teachers and peers. Students communicate generally via traditional ways.	
Students actively reflect on their learning experiences in/through digital portfolios.	Students reflect on their learning experiences at specific intervals via tools prescribed by teachers.	Students do not actively reflect on their learning experiences.	