

## **Designing ICT services with pedagogy in mind**

### **The QSITE Position**

The QSITE position on network development is that learning and teaching must be central to decision-making about the services hosted by our school networks. This needs to be balanced against the demands of developing manageable, reliable and secure networks, secondary agendas which according to QSITE research, have so far dominated the design and management of schools computing services.

QSITE is this year hosting a series of discussions and debates designed to think about network design and management from a fresh perspective. A series of articles in QUICK will reflect the debate in QSITE's online communities and provide ideas about factors which need to influence decision making in schools computing.

### **The current pedagogical context**

It is also QSITE's position that effective use of ICTs in learning requires good pedagogy. ICTs can create learning environments and change what students learn and how they learn. However, teacher pedagogy is the catalyst to deep, intellectually-challenging student learning. New theories of education and new curriculum reforms require learning to be:

- Individualized and collaborative
- Experiential, building on prior knowledge
- Self managed and cumulative
- Authentic
- Directed to higher order problem solving

MCEETYA 2005a:2

The Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) ICT Pedagogy Framework contends that ICT transforms processes of learning and teaching, making processes child centred, flexible, exploring and experimenting, focused on community engagement, highly collaborative and research-focused. They suggest current learning theories are shaping educational reform in classrooms: inquiry-based, mediated, constructivism, multiple intelligences, constructionism, connectivism, authentic problematisation, metacognition, and deconstruction, and that ICT is both a pedagogical approach and a pedagogical aid. Certainly the conversations in the QSITE community are reflecting a movement away from talking about integrating ICTs into curriculum to now discussing ICT as a pedagogical approach. Accordingly, the nature and subject matter of professional development programs is changing in this community and in the workplaces of our members.

MCEETYA also propose policy frameworks in learning architecture, (MCEETYA 2005b) as the application of ICTs to the processes that support learning, and learner-centric processes. They suggest that the tools in a learning architecture include networks services, desktop services, intranet services, interactive and online resources, interfaces and the physical configurations which support learning. Their model for learning architecture integrates decision-making at multiple layers, but each is focused on understanding ICTs as part of the core business layer of learning and teaching. They suggest that Learning Architecture needs to move focus away from “maintaining the security of information systems to developing a more holistic approach as the boundaries of applications blur and require holistic delivery” (MCEETYA 2005b:3), in school networks and in interconnections between school networks and systemic infrastructure.

There is a shift, in thinking about ICTs in learning to ICTs as an integral pedagogical tool, with some corresponding discourse about the infrastructure which supports this. Systemically, there has been increasing energy focused on integrating systems, building metadata standards for harvesting resources and taking advantage of new bandwidth strategies. This discourse has not yet permeated the decision-making frames in ICT planning in schools. The data collected in QSITE communities in 2005 (Baskin and Williams, 2005; Williams and Baskin 2005) suggests that decisions about services to learners and teachers are focused on management simplicity, restrictive policies controlling user behaviour and development of physical access. Baskin and Williams (2005) describe the quiet mantra that “more is definitely better” dominates where it shouldn’t, while “pedagogy has been the silent space in the evolution of ICTs in schools” (p.2).

This QSITE Project designed to develop commitment to changing perspective, is a welcome opportunity to focus discussions about the mantra for ICTs in learning, with the design of the services which will deliver the vision.

## **Cultural gaps**

In undertaking a study of the ICTs Integration Instrument in Queensland schools, teachers were asked to judge the level and quality of ICT experiences children are offered. While doing so, teachers clearly indicated the ICT services available to them were bereft and that they felt disconnected from decision making about ICT services and management in their schools. (Jamieson-Proctor, Watson and Finger: 2004). This added rationale to a joint research venture between QSITE and James Cook University to examine the quality of services to learners and identify the influences on decision-making.

Underpinning the study was a cognisance of the differing perspectives usually held by network managers and teachers. Barone and Hagner (2000) describe the characteristics of “the two cultures hobbled with views that prevent much influence of one by the other” ( p14). They suggest the IT culture is attuned to the whole system and the whole organisation (a strength of their perspective), wanting to prevent dangers, striving for focus and consistency (at odds with

other views) and wanting decisions that concentrate resources and effort (cognisant of their capacity to deliver). In contrast, faculty/teachers speak in idioms about how they work, the jobs they do and the culture they want to create around their work and the learning of their students. They are used to professional autonomy and not comfortable with outside agents influencing their learning environments.

Barone and Hagner (ibid) suggest that each group have presumptions about change that fuel their divisions. Teachers have a liberal presumption that there is a need to invent and experiment for advancement of pedagogical ideas and this includes wanting to try new ideas with ICT tools. IT managers on the other hand, have a conservative presumption, where change is deliberately controlled by deliberation and that services need to be proven before being implemented on a whole-scale basis. Barone and Hagner (ibid) suggest that leadership is necessary to resolve the cultural tension and that critical discussions need to host a range of views in circumstances where not everyone agrees on what needs to be transformed, nor the strategies to make such change.

The JCU-QSITE study addressed the consequence of the gap.

“This ‘user’ mindset is an expression of a broader administrative set of relations, encompassing service-level relationships based on identified client needs. The problem with being a client is that clients are ‘done to’ and ‘done for’ ....they are not expected to impose themselves on the technology, but are much more expected to have the technology imposed on them. Certainly, there will be more people using technology in our schools, but this use will be patterned rather than inspired, reactive rather than proactive, and reproductive rather than creative” (Baskin and Williams, 2005 p2)

In the QSITE community, these differing tensions often reside in the one person. Most IT managers in schools are teachers too and amidst having inadequate time to undertake the role of network designer and manager, strive to establish conditions in schools which best fit everyone’s needs. There is always debate about whether teachers should be network managers with opposing views on the costs of their labour. For some, the use of a teacher to maintain a network is seen as expensive compared to the costs of a technical support person (as if the jobs are the same). In others, the costs of network managers are compared to teachers’ salaries and reflect the complexity of the task. Salaries arguments aside, debate continues about whether teachers can bridge the gap between the culture of IT management and the culture of the pedagogical and curriculum rationales which dominate teachers’ perspectives.

In the JCU-QSITE study, the data collected from school-based ICT coordinators suggested that ICT coordinators had developed more of an IT management perspective, even though their practice in their classrooms was pedagogically sound. Further, the study suggested that the culture in the QSITE community had not matured to the point that it had yet hosted conversations about the impact of the ICT pedagogy movement on the future demands for school networks designs.

## **Pipedreams and reality**

James Cook University hosted a research study to investigate the depth of services available to learners in North Queensland schools. This data was complemented by an equivalent data set from members of the QSITE community elsewhere in the state (Williams and Baskin 2005). There was no significant difference in the results of the two cohorts. The schools selected for the study involved schools where ICT coordinators were from the QSITE membership. The schools represented state and non-state schools, rural and urban schools, and primary, secondary and p-12 schools. The study and its result have been shared with the QSITE community through the QSITE State Conference and the QSITE AGM. For the purposes of progressing this agenda, some aspects of the study are presented here to provide a rationale for current work.

The study resulted in a 3-level ranking for describing the level of ICT integration and the level of integration of services on the school network.

High systems integration schools

Medium systems integration schools

Low systems integration schools.

The High Integration category contained only large high schools, though medium and low integration categories also contained high schools. Primary schools and p-12 schools were evenly distributed into medium and low categories. There was no significant difference between state and non-state schools in all categories.

A survey completed by interview, targeted eight key areas:

- Network use, extent and health
- ICTs for learning and teaching
- ICTs for school administration
- ICT school management issues
- ICT decision management issues
- Technical issues and standards
- Systems integration
- Staff training and development.

This identified 22 components which had potential impact on schools' services integration. The study ascertained however, that only 6 of the 22 components were significant in identifying low, medium and high integration schools.

- Extent of ICT policy adoption across schools
- Collegial exchange about ICT knowledge & experiences.
- Review of ICT policy
- Optimal use of physical ICT resources
- Leadership support for ICT uptake for administration
- Embeddedness of ICTs in critical business practices

The study clearly and sadly illustrated that the 8 teaching and learning components of the data were statistically insignificant in ICT integration, integration of ICT services and decision making in schools. The study showed

that in all categories of schools, there was little school leadership in curriculum and pedagogical uses of ICTs, and little to no encouragement for innovation and experimentation with ICTs. The results suggested that in the timeframe of the study, schools ICT coordinators were busy “building the pipe”, and less centred if at all, on improving teaching and learning through ICTs.

In seeking to ascertain if schools had developed ICT-managed learning environments, virtual learning environments, e-learning systems and intranets, the study revealed that knowledge about the capacity of such services was lower than expected in all categories of schools. In low integration schools, very little was understood about the potential of intranets for example. In medium and high integration schools much more was known but there was very little evidence of any development of such services. Where services had been installed they were used mainly by the ICT coordinators and fellow peers, but were not holistically taken up across any schools. This complements a poll of 283 people undertaken in QSITE-community where most responded that their schools services were not sufficient to meet new ICT pedagogical demands.

The study uncovered the factors impacting on the quality of ICT services in schools. Longevity of the ICT coordinator or ICTs in learning leader, was the single most influential factor in the level and sophistication of school services to learners. All High Integration schools had a long term leader and all low integration schools did not have a long term leader. Who made the decisions about network services, was also a strong influential factor. In high integration schools there was diversity in decision making with strong ICT committees surfacing a variety of perspectives complemented by outside consultation. Schools with a single decision maker were often in the low integration category and a few in the medium integration category, with considerable evidence that single decision makers did not enjoy the support of the staff in the school for decisions which favoured technical perspectives rather than curriculum and pedagogical perspectives.

In this study it was important to pin down precisely what it was, that networks delivered. The use of ICT in schools benchmarked by groups like the UNESCO, provided a core understanding of levels of ICT use in schools expected by the community. It was expected that the study would reveal that Queensland networks delivered services which ensured all students had opportunity to address the UNESCO Basics.

- Operating a computer - effective file management and digital competence in an IT environment.
- Writing documents
- Using spreadsheets and information searches
- Graphic illustration
- Program writing
- Email use

## QSITE Position Paper – Capacity of School Networks

In the study, a very broad software audit of the standard desktops was conducted to see if networks delivered any other services beyond the Microsoft suite.

| <b>Desktop software beyond the Microsoft Suite</b> | <b>None</b>           | <b>1 piece</b> | <b>Some pieces</b> | <b>Many pieces</b> |
|--|-----------------------|----------------|--------------------|--------------------|
| General curriculum software                        | 8                     | 5              | 3                  | 1                  |
| Graphics manipulation software                     | 10                    | 3              | 3                  | 2                  |
| Video manipulation software                        | 13                    | 3              | 1                  | 1                  |
| File management system, not only directory trees   | 18                    |                |                    |                    |
| Music  | 12                    | 2              |                    |                    |
| Cad/Accounting                                     | All secondary schools |                |                    |                    |

This clearly suggested that the majority of the schools in the study could not deliver services to enable even the most basic UNESCO ICT literacy level. Further, the schools' support for data management and core ICT literacy was not promising.

| <b>Schools offering reasonable space for students work</b> | <b>School providing the facility for users to move data between school and home</b> | <b>Users allowed to keep information from year to year</b> |
|--|---|--|
| Under 10 mb 7<br>10 mb 4<br>20-30 mb 2<br>Unlimited 5      | Not supported 11<br>Users allowed and supported 3<br>Not addressed 3                | Not allowed 13<br>Staff allowed 2<br>Students data kept 2  |

For the delivery of online services to support learning, the data revealed the following pattern.

| <b>Service</b>          | <b>Not available for students</b> | <b>Available</b> |
|-------------------------|-----------------------------------|------------------|
| E Learning environments | 17                                | 1                |
| Email                   | 10                                | 7                |
| Intranet spaces         | 7                                 | 2                |
| Intranet services       | 14                                | 1                |

It was generally clear that schools' networks were becoming increasingly robust and reliable and that the access to networked machines was high in all schools. However the quality of services delivered across them did not match the expectations of the pedagogy and curriculum policy frameworks being held up as excellent practice, nor was it in keeping with the stories of excellence often shared by the leaders in the QSITE community. Using ICTs as a pedagogical approach is not mainstream in our schools and perhaps the

goal is unattainable until we design networks based on an understanding of learning and teaching.

## **Putting the pedagogy first**

Barone and Hagner( 2000) undertook a study of an Price Waterhouse Coopers project where a university asked the group to design a network solution and classroom design which would change the university pedagogy. Amidst the recommendations the study of the project recommended that

- When designing systems, learning is not the same as delivering and receiving content.
- Pedagogy underpins successful virtual learning experiences.
- IT solutions need to address the learning problem and be consistent with the learning and teaching values of the institution while addressing:
  - Quality and Quantity of learning
  - Scalability – across the organisation of teachers and learners as well as technically
  - Sustainability – in human terms not only technical terms
  - Resource leveraging
  - Multi-group participation
  - Timely results – early, medium and long term benefits evident
  - Feasibility – can be implemented with existing boundaries
  - Acceptance – can it be implemented to encourage ongoing discussion
  - Accountability – learning, operational and financial accountability.

When envisioning the pedagogy in ICT learning environment:

- Technology should not drive the discussion of classroom configurations.
- Teachers and students need to be involved in overall design of pedagogical spaces.
- That pedagogical demands move from direct teacher-centred mode, to discussion, to network collaboration.

Generally the report suggested strategies to move the teaching culture of the institution through a consultative and professional learning context backed by an ICT infrastructure that was pedagogy and curriculum friendly. This included issues of :

- Room design
- Placement of equipment
- Ubiquitous staff access
- Support for pedagogical and curriculum design
- Support for IT services.

## **The QSITE position on “Networks for ICT pedagogy”**

The QSITE position on network development is that learning and teaching must be central to decision-making about the services hosted by our school networks. Whilst it is easy to say that learning and teaching shape the rationale for ICTs in schools, the decision making processes within the ICT framework are often driven by economic and management agendas. Further, ICT planning often focuses on the equipment, whereas increasingly, the services across networks, peripherals and room designs are crucial catalysts to the quality of the curriculum interpretation and the school pedagogical approaches. The membership of QSITE has developed some core messages about decision making.

### **1. Pedagogical Drivers**

Curriculum and pedagogy are central rationales with the schools ICT Plan and the decision-making processes within it.

The school' philosophy of learning will be deeply embedded in the school's curriculum and pedagogical framework, telling a story about how classrooms operate. Project-based learning, community experience, access to experts from industry and the community, independent learning, collaborative learning and metacognition are increasingly changing how students learn from their experiences. How students use ICTs in classrooms, need to match the way students learn. The schools ICT resources, especially its network services, need to help teachers support new ways of learning. Further, teachers need to explore new pedagogical approaches, deeply engage students in activities which yield high intellectual quality in student work and become facilitators of learning, rather than delivery systems for content, and thus explore new ways of using different technological products, services and processes. Risk taking, innovation and exploratory action learning projects are central to teachers learning how to use ICTs as a pedagogy. Planning to enable pedagogical reform through how ICT is implemented will be a powerful driver of change.

### **2. Curriculum and pedagogy**

Learning and Teaching needs to underpin all decision making about the design and management of all ICT services in the school. The pedagogical & curriculum rationales need to be foregrounded in front of management decisions and need to truly represent the views of learners and teachers.

The clichés about student learning as primary, are meaningful only when the dialogue around schools computing services are focused on enabling learners and teachers to use increasing variety of services in flexible and exploratory ways. How learners learn and how teachers support that learning requires a robust but flexible network design which directly supports teachers' pedagogical change and growth and supports increasing learner independence and growing digital practices. Standardisation of desktop services, centralization of resources, limiting software options and placing restrictions and

boundaries around user services may not develop an ICT culture which is centred on improving learning opportunities. Teachers are best placed to describe the ICT services which will support their curriculum implementation. They need to be consulted about their ICT needs and the professional conversation around ICT services needs to have curriculum as pedagogy as its base, rather than technical and management demands.

### **3. Access and Design**

The physical access of learners to ICTs needs to reflect the pedagogical ethos at the school.

The placement of machines, network points, power outlets and peripherals shape the pedagogical affordance and culture of learning environments. Further, school decisions now about where students can access services influences future pedagogical growth into flexible and online learning, school-home – work place learning and teacher skills development. Where the ICTs are placed and where learners learn, will be a public statement about the pedagogical health of the school. Teachers need access from where they prepare material, plan lessons and interact with each other in teaching teams. Home and staff room access is imperative in a functional contemporary school. Consideration needs to be given to the extent of access to systems outside of school hours and where anytime, anywhere learning is perceived as necessary.

### **4. Global Learning communities**

The Internet is a powerful communication tool and the schools access and use, should extend far beyond using Internet services as a source of information.

In new curriculum and pedagogical frameworks, students and teachers are expected to communicate synchronously and asynchronously with other learners, other teachers, professional or subject matter experts and community members. Students need to be able to access email, web spaces, e-learning environments, learning systems and online networks of people. Students and teachers require sufficient technical access to the communication tools of a school network that enable them to manipulate their learning spaces and its core setup options. Interactivity is a key fundamental belief of new curriculum and pedagogical approaches and systems, and so policies in schools need to give control of the systems to teachers and their students. In the schools curriculum framework, communication may also include publishing for external audiences; thus students and teachers need access to web development tools including content management systems to enable them to publish easily. Where these are not practical in the school environment, teachers should have the policy flexibility to publish on “safe” public services and systems, especially those set up to assist educators (like Aussie SchoolHouse). Teachers and students should be able to easily participate in and construct online communities beyond the school system and school audience.

## **5. Local learning communities**

The school's network has capacity to develop a local community of learners, involving students, teachers, parents and local community groups, through collaborative network tools and services.

Schools ICT resources now include learning management systems, intranet services, collaborative knowledge building systems and network management systems. The sophistication of these services on a school network promote a culture of knowledge development, management and sharing in the school community. The use of such services will require training, leadership and support, so they become embedded in the learning and management processes of the school. Assisting learners to use collaborative and knowledge management tools will improve their digital skills and understanding of how digital services improve work processes and work flows and learning capacity. Schools will develop from simple Moodles and intranet tools to sophisticated and integrated learning management systems over time, not only as the technologies change but as teachers and students develop sophisticated ways of using them. The focus for such professional and personal development is bound in the curriculum and pedagogical approaches in the school environment and determination to build local learning communities.

## **6. Holistic Planning.**

The implementation of ICTs in a school is a holistic process and can not be centred on the development of infrastructure.

The cliché of “If you build it the people will come” is not effective culture in schools. ICT implementation involves clear purpose, professional learning, technical and pedagogical support, curriculum clarity and a range of interrelated factors. To result in effective use of ICTs by students, the range of factors need to be planned holistically. Building infrastructure without balancing other factors is not sustainable or justifiable. Systems need to be designed so they are both technically stable but not pedagogically restrictive. They need to include training and help systems, curriculum and pedagogical support systems and centre on how children learn and support how teachers teach.

## **7. Collaborative Decision Making**

Decision making needs to be a collaborative process driven by learning and pedagogical needs, fiscal responsibility, priority setting through budget and project management and balancing short and long term needs.

When planning the development and /or purchase of network services and infrastructure, the decisions are complex and need to be carefully undertaken by the range of stakeholders including the teachers whose pedagogical and curriculum demands are enabled, the technical team who responsibly implement the technical decisions and the school leadership who nurture the decision making process and take responsibility for its consequences. It may be necessary to acquire

information, knowledge and advice for technical and holistic decisions from both inside the school and from outside the school and schooling system. The investment in outside consultancy may save time, emotional and physical energy and avoid technical limitations and other issues. However, care needs to be taken in vetting advice from vendors or from the inschool expert whose experience has been narrow. The journey of other schools may be useful. In all decisions, the expectations of all stakeholders need to be aired respectfully and communicated clearly. Collaborative team decisions will strengthen the commitment of all parties to the decision making process and ICT implementation.

### **8. Bridging the technicians and teachers communication gap**

The school culture needs to support improving the communication gap between technical teams and curriculum teams.

IT staff and teachers need to respect each others roles in the schools and develop a willingness to consider a range of perspectives during planning, implementation and review of the capacity of the schools IT facilities to support quality pedagogy and curriculum. The school culture needs to support development of a shared language and understanding of common concepts to underpin conversations. There is a need for proactive leadership to facilitate such a school culture and events and activities in it, which lead to shared decision making and respectful learning about each other's needs and goals. In many schools, the network coordinator is a teacher struggling with playing both roles. This person needs support and respect when they play one role more heavily than the other, though also they need to be encouraged to seek a broader base of people taking on decision making and the tasks. Communication in the team will lead to stronger decisions than if one person dominates decisions or works alone. Development of a healthy, respectful and proactively helpful ICT culture will provide a context for creative pedagogical and curriculum uses of ICTs by more teachers and students.

### **9. ICT Leadership in Schools**

Systems, employers and associations should acknowledge the leadership and dedication of the QSITE membership who design, develop and maintain the network services in Queensland schools.

The leaders and network managers in QSITE work tirelessly to ensure Networks run efficiently and effectively, often in “less than ideal” circumstances. It is this group who are the last folks to leave for the day, and the first to be at school in vacation breaks. These leaders develop their knowledge on their own and rarely are given opportunity to develop professional and technical knowledge. Their expertise means they miss out on professional learning opportunities at the expense of their non - ICT literate colleagues. They always have student learning in their heart and need support to improve the culture of ICT Pedagogy in their schools.

### **10. Encouraging Innovation**

QSITE Leadership designing, building and maintaining networks, should be encouraged to explore new boundaries and should be respected for their research and experimentation which contributes to development of schools' computing services.

These leaders often push technical and policy boundaries to try new systems, new software and explore the next generation of ICT tools and systems. They regularly need to explore outside their jurisdictional system to “play” with unapproved environments and tools and some times demand to try new ideas within systems. These pioneers should be supported and enabled, not hindered by policy or shunned by procedures. QSITE advocates that ICT leaders should have greater flexibility to experiment. The expansion of this culture of innovation should be encouraged to develop throughout schools to create environments where teachers take risks with their own learning and share their experiences with others.

### **11. Policy Development**

The design of schools IT facilities and the schools policy and procedures should enable teachers to experiment and try new things.

Teachers constantly need to explore new curriculum and pedagogical ideas to engage students, flexibly implement changing agendas and remain fresh. The innovative health of the school culture is strong when teachers are suggesting changes, pushing boundaries and wanting unique and different ICT learning environments and tools. The school culture needs to be responsive to these teachers and nurture their enthusiastic attitudes. There should be a culture of saying “yes” to these teachers, rather than “no”. Further QSITE advocates the schools standard environment policies should enable teachers to have different environments and explore new software without delays. Building on Standard Operating Environment (SOE) stability, can flexibility for experimentation become mainstream practice in your school?

### **12. Performance Indicators**

The performance indicators of network coordinators and technical teams need to be allocated against the quality of curriculum and pedagogical use of school systems and procedures.

Performance of technical support staff need to be correlated against the core teaching and learning philosophies of the school. Technical teams need to take some responsibility for the curriculum and pedagogical health of the school. Technical staff need incentives to value their work of encouraging quality, creative, innovative uses of systems in their schools and devalue restrictive practices and procedures. This will complement the technical, management efficiency, responsiveness and communication qualities of their work. Technical staff might be encouraged to participate in curriculum planning, and be part of discussions with teachers about teaching strategies, student groupings, activity design and resource design. This will develop better understanding of the positions of each other's perspectives.

## Where to now?

A working group of QSITE Board are developing a series of support documents to assist QSITE leaders to approach decision making about schools computing from a learning and teaching perspective. Further issues of QUICK will include “lift outs” which can be copied and used in schools.

Any QSITE members who would value being part of the writing team and want information on the next meeting and an invitation, are welcome to contact Gayleen Jackson ([gjack1@eq.edu.au](mailto:gjack1@eq.edu.au)).

### **QSITE Management subcommittee on School Networks and ICT Infrastructure**

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