

ICT USE BY SCHOOLS IN EASTERN INDONESIA

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Abstract

This paper examines ICT use and access and students' beliefs about ICT in learning. The study focuses on schools in eastern Indonesia. Data used is in the public domain (Analytical Capacity Development Partnership, 2015) and was collected over 18 months using surveys and focus groups. Student data (3,000+) was drawn from primary and lower secondary classes. Teams of trained enumerators collected the data in a number of regencies (sub-provinces). The broader data also considered the views of teachers, principals and parents, although in this review only the voices of students are considered. Student voice is often regarded as one that historically has not been considered. Current research has shown the validity of student voice, which here is loud and clear about changes needed to improve learning in classrooms. This includes ICT access, quality of teachers and how teachers use ICT. A shift in teacher mindset and quality is suggested as a way for change to occur.

Introduction

This paper is based on data collected in an Analytical Capacity Development Partnership (2015) Project that evaluated information communication technologies (ICT) use in Education. The data analysis seeks to fill a research gap in understanding how ICT is used in Indonesian schools, including frequency of use, student attitude towards learning and ICT, and the nature of activities undertaken using ICT. Students in primary and lower secondary classes participated in two data collection activities: a paper-based survey and focus group discussions based on clarifying issues of interest identified in surveys. The research used a mixed methodology, where the data collected from the survey was both closed (qualitative) and open response (quantitative). Focus group discussion (FGD) questions were developed from analysis of survey responses. The sample size was approximately 3,000 students. Survey data were analysed using a data collation tool designed by Universitas Kristen Satya Wacana (Open Source) and SPSS (IBM), while text analysis was completed using Leximancer (University of Queensland).

The research questions investigated using the data were:

RQ1: *What are the attitudes of students towards ICT use and learning?*

RQ2: *What does use of and access to ICT look like in schools?*

RQ3: *How do students view the changes required to improve use of and access to ICT in schools?*

The Literature About Learning and Teaching with ICT

Research in ICT generally supports the notion that ICT has the potential to allow teachers to develop different teaching approaches, which in turn are reflected in pedagogical changes. In work by Hunt (2007), it was noted that certain pedagogical advantages exist for students when ICT use is included in classroom programs and practices. These include:

- Access to information, people, places and events
- Opportunity to make thinking visible to oneself and others
- Collaboration opportunities that can enhance understanding
- A desire to continue learning: life long learning.

There is also some emerging evidence in the Programme for International Student Assessment (PISA) suggesting that students who use computers at school, as well as at home, are more successful on PISA (OECD, 2011). The benefits of incorporating technologies into teaching and learning in Indonesian schools has been recognised for some time. In 2002, Yuhetty argued for the integration of technologies into school education in order to build the international competitiveness of the nation. This notion of competitiveness within and beyond Indonesia is a recurring theme in schools noted in conversations held with Indonesian teachers, students and parents. (Palekahelu, Hunt & Thrupp, 2016). In 2014, the debate about integration into the curriculum continued, with schools expected to formally integrate ICT across the curriculum. Use of the Internet in certain ways can encourage teaching approaches such as inquiry-based or problem-based learning, collaborative learning, personalised learning, self-directed learning, project based learning and problem solving (Harasim, 2012; Laurillard, 2012). Whilst this literature focuses heavily on teachers and ICT use, it has been noted that teachers who do not use or encourage the use of ICT risk creating a disadvantage for students. Key ideas coming through in the literature thus far point to advantages through the use of a range of technologies (and disadvantages when use of ICT is prohibited or discouraged). In considering the use of ICT, this analysis seeks also to investigate and understand the ways in which students use ICT.

The Literature About Student Voice and Use of ICT

This analysis is about students and their learning with ICT, and it thus was necessary to explore the literature around *student voice*: why is the data collected from students more relevant, or as relevant, as that derived from teachers and principals? Historically, findings about children and their access to and use of ICT, and specifically ICT for learning, have been based on data collected from parents, teachers (Primrose, 2003) and commentators in the field (Prensky, 2002). Limited research has produced findings from data provided by children. This approach to data collection is known as *giving voice to children and students, student voice* (Thrupp, 2008). It has been reasoned by researchers that children are unable to contribute valid data. Fromme (2003), however, argued for the need to see childhood as based in a social and cultural milieu. Consequently, to understand ICT as an element of

this social and cultural milieu, it must be acknowledged that the children are the experts (Fromme, 2003). Data collected from children using techniques that acknowledge that children provide relevant and valid information (Appleton, Hunt, Heldsinger & Thrupp, 2006; Downes, 1999; Fromme, 2003; Mojica-Casey, 2015; Somekh et al., 2002; Thrupp, 2008) is important. Jervis (2003) and Somekh et al. (2002) used drawings and concept mapping. Moreland and Cowie (2003) and Appleton et al. (2006) used cameras for data collection about children's ideas about technology. This technique was supported by interviews in studies by Thrupp (2008) and Mojica-Casey (2014), who used student voice to collect data about access to and use of ICT for learning. These techniques acknowledge the distinctiveness of gathering consistent and clear data from children and the need to capture the "social, cultural, situational and contextual" reality of children (Stake, 2005, p. 452)

The following research questions, focused on student voice, were investigated.

RQ1: *What are the attitudes of students towards ICT use and learning?*

RQ2: *What does use of and access to ICT look like in schools?*

RQ3: *How do students view the changes required to improve use of and access to ICT in schools?*

The Methodology

The research used a mixed methodology, where the data collected from the survey was both closed (surveys that included open and closed response questions) and open (using focus groups). The methodology was designed by two experienced researchers from Australia (with research experience in Indonesia) and validated by Indonesian counterparts. Language discrepancies formed a large part of this validation. The focus group discussion (FGD) questions were developed from an analysis of the survey responses, with FGDs conducted in a subset of the total school sample. A sample of 220 schools was comprised of schools that represented primary and lower secondary, with further sampling representing schools in urban, peri-urban areas and remote areas. A further requirement was that the schools sampled include private schools and others operated by charitable foundations. All surveys and focus groups were conducted in the national language. A rigorous validation process was followed to develop age appropriate instruments, using Indonesian teachers and researchers. Research ethics approval was not required as this paper used data from the public domain. Further, ethics is not a requirement for research in Indonesia.

The Data Collected and Analysed

The data collected fell into six broad areas: demographics; access and use of ICT at school; capability and attitude towards ICT use and school; other ICT use (at home); where computers are used and frequency of use; and "what do I wish for to improve my ICT skills and learning?"

1. Demographics: Stories in the Data (n=3,128)

Students in the survey ranged in age from 7 to 16. By class, students were drawn from Class 4 to 9 (primary and lower secondary, or Middle Phase of

Learning), whilst by gender there were 1,675 females and 1,453 males, relatively balanced in terms of gender representation.

2. Access to and Use of ICT at School: The Stories Told

The stories in these data are not particularly encouraging. Access to laptops and computers at school is low, a story similarly repeated when examining data about the use of digital cameras, text messaging and the Internet. This is not surprising in a nation that remains dependent on foreign aid for areas including health, education, infrastructure and good governance.

Table 1

Access to and Use of ICT at School

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- 72.1% stated that they did not use ICT at school.
 - 85% never used a laptop at school.
 - 93% never used a digital camera at school.
 - 90% did not use text messaging for learning at school and 2.4% used text messaging for learning on a daily basis.
 - 73% did not use the Internet at school, 7.5% used the Internet 2-3 times a week and 3.9% used the Internet one or more times each day.
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3. Stories About Capability and Attitude Towards ICT and School

Despite the many challenges of access to ICT, students remain very positive about using ICT for learning and school generally. Responses to questions in this field indicated a strong positivity towards using ICT and learning at school. Some open responses stand in contrast to the earlier questions: while students could clearly identify benefits of using ICT, they also identified numerous barriers or challenges.

When asked if the teacher used a range of ICT in class, 82% of students either agreed or strongly agreed. When asked if Using ICT at school helps students learn more, 85% of students either agreed or strongly agreed. In focus groups, students were quite negative about the quality of teachers' use of ICT and suggested that better teacher preparation to use ICT would create better learning for them.

Table 2

Attitude Towards Using ICT and Towards School

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- 83.3% Strongly Agree or Agree that they enjoy using ICT for learning and 7.8% stated they have no ICT access.
 - 96.0% Strongly Agree or Agree that they like being at school.
 - 96.1% Strongly Agree and Agree that they learned a lot of new things at school.
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When asked further about how ICT was used at school, most students reported that they [students] did not use ICT at school, using such comments as: never, because we have no electricity, we cannot learn with ICT, or at school there was no means of ICT. A small number of students reported using ICT such as

Internet, SMS on hand-phones (smart phones) and accessing the Internet using phones and modems.

Asked about learning at school, students reported a lack of access to ICT, together with a range of negatives: *no ICT ever; no electricity; no ICT teacher; lots of damaged computers that do not work*. On a more positive tone, a smaller number of students suggested that ICT: *increased knowledge, made learning easier and faster; in order to be smart; clearer and easier to understand; and can complete the teacher tasks quickly*.

This map (Figure 1) illustrates the connections between one concept (*Information*) and the many other ideas offered as responses, including *learning, knowledge, faster, study, science and insight*

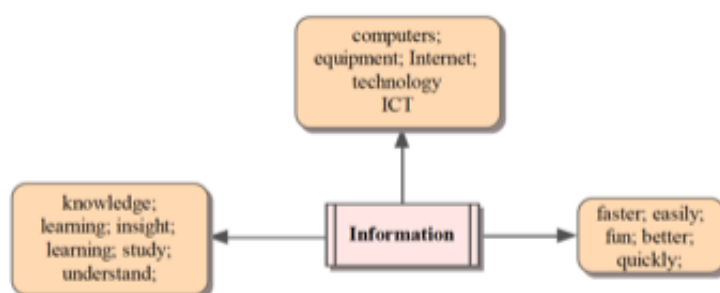


Figure 1. Map of ideas associated with the concept of *Information*.

When quizzed about *the challenges of using ICT at school*, as noted elsewhere, common challenges identified included: *absence of ICT, restricted access to ICT, no electricity; no ICT teachers; no computers or damaged computers; no laboratories; and lack of Internet*. It was noted in focus groups with teachers that if Internet access was not available, there was no point in using computers. Computers were associated here with online activity only.

4. ICT Use at Home: A Story of Differences

Data here suggests, as noted elsewhere, that students' access to ICT at home is richer than at school. Students have elsewhere suggested (in FGD and interviews) that these phones provide Internet access. The high ownership of personal phones, together with their relatively low cost, might be considered in developing a way forward. The high ownership of televisions at home also suggests that this might be way to reach informal learning at home.

Table 3

ICT Used at Home

- 62% indicated that they had their own mobile.
- 23.1% indicated that they had Internet access at home.
- 84.2% indicated that they had a television at home.
- 26.5% indicated access to a gaming machine at home.

In an open response question probing other ICT available at home, mention and frequency are illustrated in Table 4.

Table 4

ICT Mentioned and Frequency of Mention

ICT Mentioned	Percentage of Mentions/Cohort
Laptop	32.86
DVD	22.76
Radio	14.99
Tablet computer	12.78
Computer	12.75
Digital camera	10.39
Printer	8.88
Smartphone or HP	8.05
Modem	4.66
Parabola (satellite dish)	3.83

5. Stories About Location and Frequency of ICT Use

As shown in Table 5 below, schools are not rich in opportunity to use ICT. As has been noted in other educational jurisdictions, the home often provides richer opportunities to access a range of ICT.

Table 5

Frequency and Location of ICT Use

- 70.6% never used a computer in the classroom and 10.4% used a computer one or more times a day.
- 74.5% never used a computer in a school lab and 13.2% used a lab once a week.
- 77.7% never used a computer in a school library.
- 31.8% used a computer at home one or more times a day and 9.4% used a computer at home 2-3 times a week.
- 67.9% never used a computer in an Internet shop or public space.

6. Capability in Using ICT

Data here indicates that 52.9% of students reported that they were very capable or capable in the use of ICT. This must be viewed against other data that suggests experiences with ICT are often not available. However, when considered against the data from other questions, this may explain responses about capability, that is, the home is where the capacity is built. This sits comfortably with the PISA suggestion that a home-school ICT environment can produce better results in the PISA testing (OECD, 2011). When asked explicitly about capability in using, students responded as shown in Table 6.

Table 6

Capability in Using ICT

	Percentage
I do not like using ICT	2.9
Not at all capable	43.8
Capable	41.6
Very capable	11.7
Total	100.00

7. A Wish List to Improve ICT Use and Access: Stories from the Mouths of Students

Data collected here were via open responses. Analysis of the data fell into three broad categories: additional ICT students would like; why students would like a *particular piece/s of ICT*; and *what they would do with it*.

The map below illustrates one theme presented and ideas associated with the idea of *Laptop*.

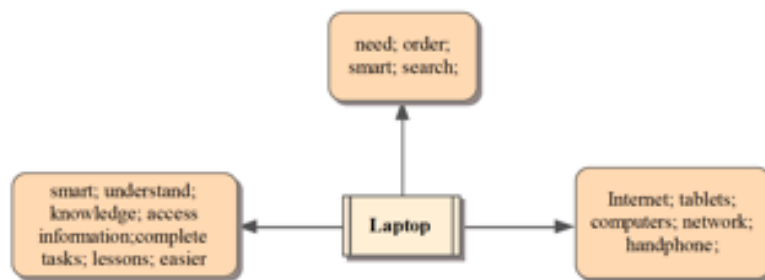


Figure 2. Map of ideas associated with *Laptop*.

Ideas commonly proffered by students relate to capacity to learn, nature of learning and content of learning, including:

- Computers make it easier to have lessons in the classroom.
- HP [hand phone], to calculate the multiplication / division.
- Email, computer, tablet, camera, Internet, SMS because I love to learn.
- Computers because it is very easy to learn; because it (computer) makes me smart.
- Our school needs a computer so that we can be smart.
- Never use HP (hand phone) as teacher forbid.
- I want schools to have electricity, computers, photocopiers, Internet; computer, to search for the task and learn about ICT.

What Did the Data Tell with Regards to the Research Questions?

RQ1: *What are the attitudes of students towards ICT use and learning?*

Students show a remarkably positive attitude towards ICT and learning at school. This is regardless of the absence in many instances of access to ICT at school. From the focus group data, students suggested that ICT could assist in better learning: making them smarter and more knowledgeable and more competitive nationally and globally. In FGDs with parents, the notion of international competitiveness was also raised. Students willingly proffered ideas as to how ICT access and use could be improved: increased access to working computers and labs, trained ICT teachers, enhanced infrastructure (power, networks and Internet) and less reliance on lessons taught from a book with little or no hands-on components.

RQ2: *What does use of and access to ICT look like in schools?*

Use and access to ICT needs to significantly improve to meet the aspirations of students (and teachers and parents): most students surveyed have little or no access to computers, laptops or tablets. From observations in classrooms and in interviews and focus groups with students, it appears teachers are not well prepared to teach using ICT and rely heavily on the use of textbooks (a substitute for hardware). Use of textbooks is common in all subjects, and it has been frequently observed that science classes are conducted in rooms with no scientific apparatus but a shelf full of aged books. In one vocational school, students were taught plumbing from textbooks with no hands-on experiences.

Understanding of ICT and its uses, including how computers function and Microsoft Office suite can be used, are completed in a rote manner and with a textbook focus. It could not be anything else when hardware is virtually non-existent. The Internet is not widely accessible. Yet, students are clear that it can help them to achieve better learning outcomes: communicating with teachers and peers, accessing current information not available in textbooks, and providing a level playing field with learners elsewhere. Use of computers at home by students is significant and suggests that programs such as Bring Your Own Device (BYOD) might work, although the notion of a *device* needs to be clarified and might mean a hand-phone or similar.

RQ3: *How do students view the changes required to improve use of and access to ICT in schools?*

Many students (62%) have their own mobile phones, which might be seen as a substitute for computers in a BYOD program. Students told of quite limited use of the Internet and Messaging using these devices. Ideas commonly proffered by students to improve ICT in learning strongly suggested improved access to hardware and infrastructure. In support of this, students articulated a compelling range of reasons for developing programs that better access would lead to, including: (a) because it (computer) makes me smart; (b) I hope there is electricity and computers in order to learn; (c) computer so that I can know the news /information from abroad that relates to a lesson; (d) I want to learn to use a computer because I want to go forward like others; and (e) computers, as easy to write and increase of my knowledge. Although students do not have significant experience with ICT at school, they appear acutely aware of the benefits and

uses possible. They appear to have a view of ICT (and computers) that shows they are not shielded from the outside world.

Discussion

What We Know

Students have spoken and described a picture of what is happening in learning at school and what could happen to learning at school. There have been both positive and negative stories, and this section endeavours to describe a way forward to allow students to have learning opportunities that are maximised through the use of ICT. Students have suggested that learning from books is limiting. Whilst this is an artefact of limited access to ICT hardware, recognition should be given to different learning styles: book learning is typically auditory/didactic, whilst ICT and computers thrive on visual/spatial activity. This will require a pedagogical shift for teachers, but it has been shown in other education systems that such a shift can be used to grow learning outcomes. Teacher education institutions will need to be at the forefront of this, with support from education authorities.

The Future

Better access to ICT and access to a broader range of ICT is a requirement evident in the responses of these students. The challenge is to frame a response that includes funding. How can a response to this be framed and funded? What are the competing priorities for the funding bodies? Is education seen as an investment in national economy and competitiveness? Students (and teachers and parents) suggested improved access to a range of hardware and infrastructure (computing devices, electricity, and communications access including the Internet). With the advent of such hardware as Telco in a Box (Cosseboom, 2014) and small, inexpensive solar Power Banks, a solution may not be so distant. Some schools had been entrepreneurial in their acquisition of ICT hardware and infrastructure. These should be identified and robust case studies of 'what works' shared widely. Most of this is applicable to the broader context of learning in eastern Indonesia. To achieve a sustainable pedagogical shift, ICT leaders will need to be developed in schools; this might require that an ICT Competency Framework be developed, possibly based around Puentedura's SAMR (2014) model of ICT adoption. This suggestion is a response to the students' notions of the quality of ICT teachers in schools. To build on student enthusiasm for learning and a desire to be 'smart,' or to achieve any or all the above, ICT budgets and ICT plans will need to be developed and implemented. These small ideas are a package that together can make a difference. There is a plethora of research in both developed and developing countries to show that these notions can make a difference. If the education sector improves, it follows that other government infrastructure sectors will follow: health, roads, water, electricity etc. An investment in tomorrow's citizens pays dividends for individuals and the nation.

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