ICT USE BY SCHOOLS IN KOTA SALATIGA, CENTRAL JAVA

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Abstract

This research sought to identify the range of information communication technologies (ICT) accessed and used by students in Kota Salatiga (Central Java). The study endeavoured to fill a research gap about how ICT is used in Indonesian schools. The instruments developed are seen as tools for use in developing countries. The survey collected data that was quantitative and qualitative. The research questions investigated were:

1. What is the range of ICT presently used in schools?
2. How are ICT used? What is the frequency of their use?
3. What ICT would students like to use in classes?

Introduction

The views of students about the use of information communication technologies (ICT) in schools provide for pedagogical action to meet the needs of contemporary learners in a global economy. This project sought to identify the type of ICT accessed and used by students in Kota Salatiga (Central Java). The study attends to a research gap in understanding the use of ICT in Indonesian schools by collecting data from students in primary, lower secondary, senior secondary and vocational schools who participated voluntarily in the data collection activity: a paper based survey. This study considered the frequency of use of ICT and school and home contexts. The research used a mixed methodology, where the survey collected data that was both closed (quantitative) and open response (qualitative). The sample size was 1738 students. Survey data were analysed using a data collation tool designed by Universitas Kristen Satya Wacana (UKSW) while text analysis was completed using a range of additional open source and commercial tools. This was a collaborative study by researchers from UKSW and University of the Sunshine Coast (USC), establishing baseline data to inform future policies for using ICT in education to improve the quality of teaching and learning in the schools of Kota Salatiga, and by broader inference, Indonesia.

Literature about ICT in Learning

The benefits of incorporating technologies into teaching and learning in Indonesian schools have been recognised for a considerable time. Yuhetty (2002) argued for the integration of technologies into school education in order to build the international competitiveness of Indonesia, noting that the success of utilization of ICT depends on

the infrastructure, which includes the telecommunication network, the availability of Internet facilities and the use of Internet and the power grid. This notion of how access to ICT can increase competitiveness within and beyond Indonesia is a recurring theme in schools in substantial dialogue held with Indonesian teachers (Analytical Capacity Development Partnership, 2015). The literature about ICT in learning generally supports the notion that ICT allow teachers to develop different teaching approaches, which in turn are reflected in pedagogical changes. Hunt (2007) noted that certain pedagogical advantage exists for students when they use ICT. Hunt suggested that when learners use ICT, they can be exposed to a number of advantages, including:

- 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: lifelong learning

Indonesian teachers (Silviyanti & Yusuf, 2014) also recognized these advantages for students in achieving constructive outcomes, couching much of their commentary in terms of the need to prepare teachers to be better users of ICT, ensuring students can gain these advantages. However, many teachers prefer the traditional ways of teaching: "This is how I was taught, so I will teach the same way." Another aspect of research toward the contribution of ICT to learning relates to home-school ICT access and use. Emerging evidence in the Programme for International Student Assessment (PISA) (Organisation of Economic and Cultural Development, 2014) suggests that students who use computers at school, as well as at home, are more successful on international testing of reading. Key ideas evident in the literature point to the advantages accrued through the use of a range of technologies (and disadvantages when use of ICT is prohibited or discouraged), including mobile devices. Many studies choose to collect data from teachers and parents. In considering the use of ICT, this study seeks to investigate and understand the ways in which students access and use ICT through the eyes of students.

The Literature about Student Voice

While there is a need to understand teacher perceptions of ICT use, a balanced view is constructed by identifying student perceptions of ICT use and access. This study was about students and their learning with ICT and thereby acknowledged the worth of *student voice* as equally relevant to data collected from teachers and parents. 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, 2007). Limited research has produced findings from data provided by children. Thrupp (2008) describes this approach to data collection as giving voice to students, student voice. Children are able to contribute valid data. Fromme (2003) 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 (Downes, 1999; Fromme, 2003; Somekh et al., 2002; Thrupp, 2008) are important to the dialogue of ICT in learning. Jervis (2003) and Somekh et al. (2002) used drawings and concept mapping. Moreland and Cowie (2004) used cameras for data collection with children 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. 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 particularly on student voice, are considered relevant to this study.

1. What is the range of ICT presently used in primary, lower secondary, senior secondary and vocational schools in Kota Salatiga?
2. How are these ICT used in classes? What is the frequency of their use?
3. What ICT would students like to use in classes?

Methodology

The research used a mixed methodology, where the survey collected data that was both closed response (using Likert scales) and open response (qualitative). Trained enumerators were sent to schools to administer the surveys. The fifty-two schools provided 1738 participants located in Kota Salatiga, Central Java, Indonesia. The schools represented primary/elementary, lower secondary, senior secondary and vocational phases of schooling. Further sampling represented schools in urban and peri-urban areas; a further consideration was that the schools represented approximately 60:40, in favour of government schools. The remaining schools were either private schools or those operated by charitable foundations (yayasans). Data analysis was a collaborative effort of researchers from UKSW and USC. It was completed using SPSS and an online data collation tool developed by staff at the Faculty of Information Technology, UKSW. All surveys were conducted in Bahasa Indonesia with translations of open response data provided for English-speaking researchers. Permission was granted by the Kepala Dinas Pendidikan: Kota Salatiga. Ethics approval was granted by the University of the Sunshine Coast Human Research Ethics Committee.

Data Analysis

In this section, data from Questions 1, 2, 3, 4, 5, 6 and 9 are analysed. Questions 7 and 8 of the survey probed the use of smart phones and social media and are the subject of a future paper.

Demographic Data

The data demonstrates a balance between the primary (33) and secondary (19) sectors and between gender. It represents Years 5 to 12 of formal education in Indonesia.

Table 1

Number of School Type in Sample N=1738

	Number of type	Number of female students	Number of male students
1. Primary/Elementary	33	481	456
2. Junior Secondary	10	218	201
3. Senior Secondary	6	151	105
4. Vocational High School	3	68	58

Access to and Use of ICT

The data probing student use and access to ICT at school was collected from nine questions. The following is a broad summary, including instances where data have been considered at the school type level.

Table 2

Access to and Use of Computers at School	N=1738
35.5% of students never use a computer in class	
53% of students use a computer either one or more times a day or two to three times a week.	
84.2% of students do not use digital cameras in classes	
5.2% of students do not use television for learning in classes	
16.7% of students use email at school	
16.5% of students use text messaging at school either one or more times a day or two to three times a week	
50.9% of students use the internet at school either one or more times a day or two to three times a week	

For the complete cohort, the trend is for use to increase with years of schooling. Of participants, 53% used ICT at school one or more times a day or two to three times a week. This is supported by 51% reporting use of the Internet at school and 25% reporting use of email at school. However, other uses such as laptops, tablets, digital cameras, television and messaging are not strongly evident. An analysis of the data above, by school type, shows that 50.1% of primary/elementary students use computers either one or more times a day or two to three times a week. For students in lower secondary, the frequency of use decreases to 37.7%. However, for students in senior secondary and vocational schools, there is an increase to 77.9% and 78.2% respectively. One question sought responses about using the Internet for learning. 50.9% students use it either one or more times a day or two to three times a week. When these data are examined by school type, it shows that 37.3% (349) students in primary school use the Internet either one or more times a day or two to three times a week; 53.5% of students in lower secondary use the Internet either one or more times a day or two to three times a week; 91.7% of students in senior secondary use the Internet either one or more times a day or two to three times a week; and 59.5% of students in vocational schools use the Internet either one or more times a day or two to three times a week.

Attitude to School and ICT Use

A series of questions in the next part of the survey considered the issues of attitude to using ICT, attitude to school and how ICT was used at school. It was considered unnecessary to analyse by school type with participants from all categories of schooling highly represented in the positive.

Table 3

Use of ICT at School and Attitude to School and ICT Use	N=1738
90.3% of students reported that their teacher uses a wide range of ICT	
91.1% of students believe that ICT helps them to learn more	
89.6% of students enjoy using ICT for learning	
87.3% of students expressed the view that they like being at school	
97.3% of students expressed the view that they learn a lot of new things at school	

Participants expressed a strong and positive attitude to school and learning. Furthermore, they strongly believe that ICT would contribute to increased learning. Within this data, it is difficult to ascertain if this belief is due to the use of ICT by teachers in the classroom (90.3%) or students having experiences beyond the school that help them know how ICT can support learning. Participants report limited use as is evident in the nature of and number of responses in Table 4.

Table 4

In What Ways Do You Use ICT at School?	*Not all students responded*
Common themes here related to:	
Completing lessons (92 references)	
Finding information and knowledge (422 references)	
Finding materials for presentations and completing tasks (479 references)	
Typing notes (74 references)	

Out of School Use of ICT

Participants accessed and used ICT outside of school, both at home or elsewhere. In previous research in Australia, it had been found that home ICT environments were richer than that at school (Appleton, Hunt, Heldsinger & Thrupp, 2006; Thrupp, 2008). These data (Table 5) support this notion.

Table 5

Other ICT You May Use	N=1738
88.5% of students own or use a mobile phone	
58.1% of students have Internet access at home	
98.5% of students have television at home	
34.8% of students have a gaming machine at home	

The high level access to phones (88.5%) in association with Internet access provides access to a wide range of ICT processes unavailable at school. Further analysis by school type found Internet access in the home increasing with age from 53.8% of primary students to 94% junior secondary whilst for senior secondary and vocational schools the figures respectively are 97.2% and 96.8%.

Table 6

Examples of Other ICT Used at Home			*Not all students responded*
	No. of references		No. of references
Computers	332	Handphone (HP)	471
Laptops	732	Television	142
Notebooks	37	Calculator	36
Tablets	320	WiFi Modem	52
Radio	361	Printer	22

These open responses (Table 6) provided insight into home ICT environments. The limited range could be due to lack of identification by some participants as to examples of ICT in the home. This was found to be problematic in a study by Appleton, Heldsinger, Hunt, & Thrupp (2006). Home environments are tending to be richer than

school, a not uncommon situation. This disparity has so far not encouraged students away from an interest in schooling generally but they are clear that school could offer more ICT opportunity, whether it be through a supported Bring Your Own Device (BYOD) program or greater access to ICT at school.

Where Computers Are Used and Frequency of Use

While the previous sections have enabled a comparison of the school and home ICT environments, data analysis here delves more deeply into the nature of the use of computers at school. Knowing where computers are used in schools can provide an insight to the pedagogies employed by schools and teachers, e.g., are laboratories of computers the most effective way to deploy them? It can also provide an insight about time available to use computers and potential indicators about the professional development needs of teachers. Table 7 shows broad information about student use of computers at home and school, providing for ready comparison.

Table 7

Where Computers Are Used and Frequency of Use	N=1738
31.2% of students use a computer in their *classroom* either one or more times a day or two to three times a week	
64.1% of students use a computer in a school laboratory either one or more times a day or two to three times a week	
71.5% of students use a computer *at hom*e either one or more times a day or two to three times a week	
26.3% of students use a computer in an *Internet shop or public space* either one or more times a day or two to three times a week	

Use of computers away from the school environment outweighs use in the school environment. Further examination of data shows 12.7% of primary students use computers in a laboratory one or more times a day or two to three times a week as compared with 17.2% of junior secondary students. Increased use was evident for senior secondary students with 35.9% and 63.5% of vocational students. There appeared to be limited availability of ICT in school libraries.

Software Used in Schools

The survey suggests that the software available for student use is limited. Microsoft Office Suite was noted in many instances. With the exception of MS Office and Corel Draw, all other noted packages comprised freeware. An analysis of student responses is shown in Table 8 and Table 9. This data is indicative of use and does not allude to quantity of use or competency with the software.

Table 8

Software Used with ICT at School	N=1738
94.1% of students have used Microsoft Word at school	
77.6% of students have used Microsoft Excel at school	
71.1% of students have used Microsoft PowerPoint at school	
23.1% of students have used Photoshop at school	
20.7% of students have used blogs at school	
14.0% of students have used wikis at school	

Table 9

Other Software Used with ICT at School *Not all students responded*

	No. of references		No. of references
Paint	711	MS Word	57
Google	286	Notepad	53
Corel Draw	210	YouTube	50
Google Chrome	177	Adobe Flash	34
Mozilla Firefox	122	Email	10

The use of online tools like blogs and wiki is infrequent -- possibly suggesting that they are not valued for learning at any level of schooling, or that teachers are not comfortable in their use. The use of blogs was analysed at school type level, increasing from 9.5% for primary students to 32.4% for junior secondary to 37% for both senior secondary and vocational students. Limited use of some software could be indicative of the need to further investigate how these tools can be used to support learning.

Student Capability: Self-Ranked

Students were asked to self-rank themselves in terms of how capable or proficient they were at using ICT: 77.5% of students rated themselves as Capable or Very Capable. Evidence suggests that capability is constructed at home and not through school access or use. Further investigation of criteria used by participants to self-rank would clarify this data, especially exploring the criteria across the years of schooling.

Wish List for the Future of ICT at My School

Students were asked to make open-ended suggestions at to how their ICT experience at school might be enhanced. While most responses focused on ICT devices, a number also spoke of the need to have better qualified ICT teachers. Commentary suggests pedagogical changes that enrich the engagement of students in different approaches to learning enabled by ICT. Participants portrayed knowledge of the extended types of learning (e.g., finding information) available to the contemporary student where ICT-enabled learning is an element of curriculum design. (ACDP, 2015; Thrupp, 2008). Typical responses are listed below and should be considered in the context of words they are associated with.

Table 10

What Do You Wish for in New ICT?

- **Practical** work using computers and **not text books**
- **Finding** information more **easily**
- Having better **WiFi access**
- Using **smartphones** in class
- ICT makes **better learning**
- Google helps to **find information** and **improve knowledge**
- **Skilled teachers** for advanced ICT

The phrases above are a compilation of the broad themes identified in the data. Leximancer (University of Queensland) was the text analysis tool used. The responses here suggest a need for a pedagogical shift in teaching, a shift away from a didactic, aural and book oriented pedagogy towards a pedagogy that supports creativity, independent and collaborative learning, and is visually and spatially oriented.

Answering the Research Questions

Following is an analysis of how the data previously discussed and analysed contributes to answering the research questions.

RQ 1: What is the range of ICT presently used in primary/elementary, junior secondary, senior secondary and vocational schools in Kota Salatiga?
Access to ICT appears an issue for students in some schools, particularly the primary years. Generally, access and use increases at the upper end of schooling. The range of ICT is limited, both in hardware and software. This finding is in contrast to ICT access and use at home. Use and access in the home increases further towards the upper years of schooling. Use and access at school is also much higher in the upper years of schooling. This is consistent with findings in Western countries like Australia. Despite this, students remain positive about using ICT for learning and enjoy attending school. It appears that their view that ICT supports learning has been developed more from their access and use at home.

RQ 2: How are these ICT used in classes? What is the frequency of their use?
Frequency of use of ICT in schools in Kota Salatiga ranges from Never to One or more times a day. Some of this relates to the use of ICT by teachers. The use by students is less frequent. This suggests one of two issues. Firstly, it could suggest that teachers view ICT as of use to learning only if use is within a teacher-directed context, this being the teacher using the ICT. Secondly, it could suggest a lack of ICT resources in sufficient quantity to enable access by students. The lack of ICT such as digital photography, wikis and blogs suggests the need for exploration by teachers of their use in creative ways to extend learning, that is, using new tools for new ways of learning. The software listed by students suggests new tools are being used for old learning and old ways of learning. This may suggest a more traditional view of curriculum and pedagogy.

RQ 3: What ICT would students like to use in classes?
Participants were clear and comprehensive on the view of ICT needed to meet their needs as contemporary learners. It is noteworthy that students understand that access is not the answer but that ICT use in the classroom needs to be matched by pedagogical change through different approaches to and different ways of learning. For example, note was made of the need for students to locate information through hands-on access. In planning for the use of ICT, teachers need to design alternate classroom management and evaluate the use of collaboration and communication between students, now easily enabled by ICT. Students were also insightful of the needs of their teachers, identifying that they need teachers with a greater knowledge of ICT and readiness to adapt pedagogy, sometimes moving away of traditional approaches.

Where to from Here?

It can be concluded that participants enjoy their current schooling though data at the higher end of schooling is less conclusive than for primary and junior secondary schooling, due to sampling size. Currently though, learning with and about ICT appears to be largely a function of the home. Students are suggesting that the responsibility for learning with and about ICT could rest more fully with the school. They also suggest that for this to occur a wider range of ICT-enabled learning contexts need to be implemented, and, for this to occur, support for teachers in strengthening both their knowledge of ICT and alternative pedagogical approaches is required. Consequently,

there is evidence in this study for schools, teachers and education systems to reflect upon the identity of contemporary learners and work with this identity to improve the ability of Indonesia to compete.

This study has provided validity for the instruments developed: survey forms and collation tools. Negotiations are progressing with a view to developing a fully online version of the instrument that can be accessed by other schools seeking to determine their student ICT profiles and views of ICT access and use at school: a sort of student ICT Opinion Survey. Data of this nature can inform school planning for ICT acquisition and maintenance, as well as drive pedagogical change through targeted Teacher Professional Development.

Acknowledgments

The support provided by the Kepala Dinas Pendidikan, schools, teachers and students of Kota Salatiga is gratefully acknowledged. The research students who acted as enumerators are thanked for their considerable contribution.

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