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HEADMASTERS AND INFORMATION AND COMMUNICATION TECHNOLOGY: APPROACHES IN MAKING THE CONNECTION

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Secondary school principals, primary school headmasters and teachers are some of the stakeholders who are responsible for translating the government's aspirations for ICT-driven engaged learning into viable classroom practices. Principals and headmasters have a significant influence on teachers' use of ICT in teaching in schools. Principals and headmasters bear responsibility in developing approaches to ICT implementation that will encourage teachers to innovate their teaching and students to learn more productively. The approaches that principals and headmasters adopt need to encompass considerations such as how the technologies are to be used for educational purposes, what are some problems that teachers may encounter and how collectively these problems can be overcome. For the approaches to be viable and sustainable there is a requirement for supportive staff, both teaching and technical to be involved in these efforts. The purpose of this study is to investigate what approaches to ICT implementation are adopted by primary school headmasters in Brunei, and their levels of ICT adoption vis-à-vis teachers' levels of ICT adoption and awareness of headmasters' preferred approaches. Primarily quantitative techniques were used to collect and analyze the data collected from the two questionnaire surveys of Headmaster Questionnaire, HQ and Teacher Questionnaire, TQ.

Keywords: ICT implementation; ICT adoption; ICT in education; headmaster; principal.

1. Introduction

In Brunei Darussalam, the school system is now changing directions toward a model of innovative education – a key aspect of which is to fully utilize the potentials that information and communication technology (ICT) can offer. The government of Brunei Darussalam has extensively encouraged primary and secondary schools to implement the use of ICT across the curriculum. Since 2000, the government has approved a significant amount of funding to upgrade the facilities in computer laboratories in all primary and secondary schools in Brunei. In 2013, the Whole School ICT Development (WSID) was launched to promote innovative learning and foster creativity in education. The WSID

was the initiative to bring together principals, teachers and students in developing a culture of ICT in schools.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) provides education strategists with the UNESCO ICT in Education Toolkit, consisting six toolboxes, two of which covers the areas for planning for implementation of infrastructure, hardware and personnel training; consolidating implementation plans and financial and managerial implications into a master plan; and assessment of implementation, effectiveness and impact of ICT interventions and subsequent adjustments and follow-up actions.

The Office of Technology Assessment (1995) outlined some of the promising approaches to technology implementation. The approaches include the following:

- Developing technology-rich classrooms, or schools, in which local expertise in various applications of technology can be developed and shared;
- Training master teachers, who then can serve as resources for their colleagues;
- Providing expert resource people from other staff, such as librarians, computer coordinators, or volunteers from business, parent, and students groups;
- Giving every teacher a computer, training, and time to develop personal confidence and expertise;
- Training administrators so they can serve as technology supporters and guide efforts within their schools or jurisdiction; and
- Establishing teacher or technology resource centers, ideally with ease of teacher access through online services.

Headmasters of primary schools described in this paper were asked to indicate which of the above approaches were adopted in their ICT implementation programmes or describe alternative approaches that were different from the ones in the above mentioned list.

2. Research Context of the Study

It has been reported that ICT leadership of principals remains a topic that is not frequently considered when theorists or practitioners discuss the unfulfilled promise of ICT in education (Yee, 2000). The study reported in this paper hopes to contribute knowledge to the scarce scholarship in this area, particularly from a Bruneian primary schools' perspective. In this study, Brunei being small in geographical size, accessibility to all schools in Brunei was practically possible and in Brunei, time is usually not a hindering determinant for data collection. Thus, it was possible to include all primary schools in Brunei as the important source of data in this study. The research project involved distribution and collection of a survey questionnaire - headmaster and teacher questionnaires in all primary schools in Brunei. The data from the questionnaire were then analyzed using descriptive statistics and correlation analyses, to identify and compare headmasters' and teachers' views about the use of ICT in schools. The findings from the analysis of the data corpus are reported in this paper, followed by discussions and implications for teaching practices.

3. Literature Review

The global expansion of communication technology has enabled a greater degree of free access to information. The globalized communication and information network has become an unavoidable necessity to the masses in this era of knowledge-based economies. Citizens need to be systematically educated in the processes of searching for, accessing, evaluating and applying information in their everyday lives. Schools and educational institutions in general have a key role to play in this educational endeavor of creating greater information literacy awareness of information literacy. Schools also need to leverage upon the ever expanding resources of communication technology and digital media platforms to teach information literacy as part of their enacted curriculum. School leaders, therefore, have a critical role to play in facilitating this implementation process. School leaders' visions and goals for the seamless integration of ICT in curricular development and delivery constitute a key step in the selection of appropriate strategies for successful ICT implementation (Yuen, Law, & Wong, 2003).

The evolution of technology and its inclusion within the school curriculum have made it necessary for a change of approach in the school managements' aspirations for educational excellence (Applegate, McFarlan, & McKenney, 1999). Telem (1996) proposed a framework for informing school managements on the processes of implementing information systems. This framework consisted of five vital components: technical, structural, psychosocial, goals and values, and managerial. It clearly indicated a complex underlying management process that requires commitment to the part of the leadership and in tandem a significant attitudinal and behavioral change in staff.

With regard to change in curriculum and pedagogy, Fullan (1993) provided a framework that addressed the complexity of the change process in schools and proposed the formulation of a common vision as a critical step in implementation process. This framework served as a general concept for understanding the nature and challenges of change involved in ICT implementation in schools. Based upon Fullan's work, it is evident that principals and headmasters need to develop and articulate clear conceptions of the vision and approaches to ICT implementation in their schools so that such implementations can produce change.

The process of implementation of ICT clearly poses a great challenge to the school leadership. A huge part of this challenge is for principals and headmasters as school leaders to bring about changes that involve a transformation in teachers' pedagogical strategies (Creighton, 2003; Flanagan & Jacobsen, 2003; Schiller, 2003). Fullan (1992) identified three dimensions for change in teachers' use of ICT and computers in the classroom:

(1) the use of new hardware and software resources;
(2) the adoption of activities, behaviors or practices; and
(3) changes in beliefs and understanding.

The key factors associated with the implementation process are factors such as innovation, commitment and support, professional development and leadership styles of

principals (Fullan, 1992). Yee (1998) presented five information technology leadership types from a study of school principals in New Zealand, namely, technology entrepreneur, technology caretaker, technology trainer, technology modeler, and technology learner. The study described in this paper investigated headmasters' and teachers' views about the headmasters' roles as motivators, supporters, strategic planners, enforcers, and supervisors. In another elaborate study of the principals' in ten ICT-enriched schools in Canada, New Zealand, and United States of America, Yee (2000) further defined eight types of ICT promoting school leadership - namely: equitable providing, learning-focused envisioning, adventurous learning, patient teaching, protective enabling, constant monitoring, entrepreneurial networking, and careful challenging. She also concluded that the principals involved in her study exhibited the eight roles to varying degrees of effectiveness.

Seong and Ho (2012), however, showed that the process of implementing an instructional reform involving the use of ICT required a distribution of leadership among the senior management (principal or headmaster) and middle management (head of department or Level Head). Together, they executed a combination of transformational leadership (performed by senior management) and instructional leadership (performed by the middle management) to develop teachers' capacity for an enhanced ICT instruction. Furthermore, an emotional leadership was also required to support teachers' effort to change, and a strategic management of resources was essential to sustain teachers' change efforts.

For ICT innovation to happen at the level of an individual school, there is a need for development in school leadership and organization per se because teachers are naturally resistant to major organizational transformations and innovations (Dimmock & Goh, 2011). This study attempted to rectify the approaches for school leaders to connect ICT implementation in schools with the teachers.

4. The Study

The purpose of this study is to investigate the approaches adopted by primary school headmasters, and their levels of ICT adoption to promote the use of ICT in learning, and how these approaches relate to teachers' awareness of the approaches and adoption levels to implement in their teaching practices. The overall key research question for this study is: What are the headmasters' approaches to ICT implementation in schools and what roles do they play in these efforts?

The following specific component research questions were formulated to inform and execute the research goals of this study:

(1) Does the school have a strategic plan for ICT implementation, expectation for the requirements for teachers to use ICT in teaching their subjects, and the provision of staff, and incentives to promote the use of ICT in teaching?
(2) What are the headmasters' roles in the implementation of ICT in education?
(3) What are the approaches to ICT implementation that headmasters adopt in their school curricular programmes?

(4) How do headmasters' approaches to ICT implementation relate to teachers' awareness of the implementation of these approaches?
(5) How do headmasters' levels of ICT adoption relate to teachers' levels of ICT adoption?

This study employed a survey using the headmaster questionnaire (HQ) and teacher questionnaire (TQ) to generate quantitative data that was used to establish the basis for wider generalizations of ICT implementation in primary schools. The headmaster questionnaire (HQ) and teacher questionnaire (TQ) surveys were sent to 66 government primary schools. Sixty-six headmasters and 1,138 teachers returned the questionnaires. The Cronbach's Alpha coefficient of reliability of the HQ and TQ was 0.70.

4.1. *Characteristics of respondents*

Table 1 shows the demographic background of the headmasters and teachers who

Table 1. Demographic background of headmaster and teacher respondents.

		Headmaster (N = 66)		Teachers (N=1,138)	
	Group	Valid N	Valid Percent	Valid N	Valid Percent
Sex	Male	29	43.9	292	25.7
	Female	37	55.5	832	72.6
Age	20 - 29	1	1.5	475	41.4
	30 - 39	8	12.1	340	29.9
	40 - 49	45	68.2	233	20.5
	50 - 55	12	18.2	65	6.0
Teaching Experience	0 - 5 year	1	1.5	498	43.8
	6 - 10 years	2	3.0	192	17.0
	11 - 15 years	12	18.2	135	11.9
	16 - 20 years	8	12.1	93	8.2
	21 - 25 years	8	43.9	136	11.1
	26 over years	29	19.7	65	6.0
Qualification	Ph.D.	0	0	0	0
	Masters	15	22.7	17	1.5
	BA/BSc	47	71.2	513	45.1
	Diploma/Certificate	3	4.5	561	49.3
Subject	English	n/a	n/a	117	10.3
	Malay/MIB			94	8.3
	Science			52	4.6
	General Paper			2	0.2
	Mathematics			42	3.7
	Art			15	1.3
	Physical Education			10	0.9
	Geography			21	1.8
	History			12	1.1
	IRK/PAI/Arabic			47	4.1
	Home science			3	0.3
	Commerce/Econ/Acc			7	0.6
	ICT			13	1.2
	Multiple subjects			657	57.7

responded to the questionnaire. For the categorical variable of sex, there were more females (55.5%) in comparison to males (43.9%) among the headmasters. Similarly, among the whole sample of teachers, there were more female (72.6%) than male (25.7%) teachers. Table 1 also indicates that more than half of the headmasters (68.2 %) were aged between 40 and 49 years old, and about 44 percent had less than 11 years of teaching experience (64.1%). A majority of the headmasters (93.9%) held at least one degree (BA, BSc, Masters or Ph.D.) while the rest held either diplomas or certificates (4.5%). Among the teacher respondents, about 41 percent were aged between 20 to 29 years old (41.4%), and 44 percent had at least have six years of teaching experience. A greater proportion of the teachers were diploma or certificate holders (49.3%) while the rest were degree holders (46.6%).

5. Results and Discussion

This section presents the results of the statistical analyses and provides answers to the research questions formulated to achieve the objectives of the research study. The first research question was: Does the school have a strategic plan for ICT implementation, expectation for the requirements for teachers to use ICT in teaching their subjects, and the provision of staff, and incentives to promote the use of ICT in teaching?

Table 2 shows the headmasters' and teachers' responses to items in the HQ and TQ questionnaires that address this research question. A majority of both headmasters (74.2%) and teachers (74%) indicated that their schools have a strategic plan for the implementation of ICT. About three quarters of headmasters indicated that having a strategic plan was extremely important (63.6%) while about a quarter indicated that it is moderately important (31.8%).

However, teachers indicated differently in that less than half indicated moderate importance (48.9%) while only about 43 percent (43.2%) indicated extreme importance. This reflects the differences in the ways in which headmasters and teachers view the roles and utility of ICT strategic plans. As school leaders, headmasters envisage these strategic plans as key policy blueprints in conceptualizing and informing the overarching implementation of ICT-enabled educational programmes in their schools whereas teachers pragmatically concerned with how ICT hands-on can be applied in their everyday classroom teaching practices seem less bothered about the necessity of ICT strategic plans.

As indicated in Table 2, it can be observed that less than half of headmasters indicated that they required their teachers to implement ICT in their teaching to a certain extent (47.0%) while about 39 percent of them reported that they definitely expected that their teachers use ICT in teaching (39.4%). Mirroring a similar trend, less than half of the teachers also indicated that they were required to use ICT in teaching to a certain extent (49.4%) while about 34 percent responded that they were definitely required to use ICT in teaching (34.4%). This evidently demonstrates that both headmasters and teachers were well aware of the government's growing emphasis on capitalizing the potential of

Table 2. Headmasters' and teachers' responses to HQ and TQ questionnaires respectively (in percent).

	Item	Response choice	Headmaster (N= 66)	Teacher (N=1138)
HQ	Does your school have as strategic plan for ICT	Yes	74.2	74.0
TQ	implementation?	No	15.2	20.3
		Not sure	10.6	3.7
HQ	How important is it for your school to have a	Extremely	63.6	43.2
TQ	strategic plan and resource allocation policies	Moderately	31.8	48.9
	promoting the use of ICT in your school?	Not very important	3.0	5.1
		Unsure	1.5	0.4
HQ	Is it expected that all teaching staff in your	Definitely	39.4	34.3
	school will implement ICT in the teaching of	To an extent	47.0	49.4
TQ	their subjects?	Hardly at all	12.1	11.3
	Are you expected to implement ICT in the teaching of your subjects?	Unsure	1.5	4.5
HQ	What proportion of your academic staff	100%	1.5	1.8
	actually implement ICT into their teaching on a	75%	25.8	5.9
	regular basis?	50%	34.8	20.7
TQ	What proportion of your teaching time actually	25%	28.8	49.4
	used for implementing ICT in your teaching on a regular basis?	0%	3.0	15.5
HQ	Are these any academic or technical staff	Yes	30.3	57.7
TQ	positions in your school that are funded to	No	62.1	36.7
	specially to deal with the implementation of ICT in education?	Not Sure	6.1	5.1
HQ	Are there academic positions in your school	Yes	69.7	55.9
TQ	dedicated to ICT?	No	27.3	14.4
		Not Sure	3.0	29.2
HQ	Name of staff position	ICT coordinator	4.5	2.2
TQ		Subject teacher	1.5	3.7
		Technician	1.5	2.0
		None	90.9	90.2
HQ	Does your school provide rewards or special	Yes, definitely	16.2	18.7
TQ	recognition for the implementation of ICT in	To some extent	37.9	36.6
	teaching and learning?	Not at all	37.9	41.6
		Not sure	4.5	2.5

emergent technologies to enhance the pedagogical capabilities of schools and boost the educational performances of students.

Headmasters indicated that between 25 and 35 percent of their academic staff used between 25 to 75 percent of their teaching time by implementing the use of ICT. Nearly 50 percent of the teachers indicated that they only used 25 percent of their teaching using ICT (49.4%). Only 21 percent of teachers indicated that they used 50 percent of their teaching time using ICT. This shows that despite the high level of emphasis and expectations placed upon teachers on integrating ICT in instructional delivery, only a

quarter of curricular time involved ICT-enabled learning. This is an area that requires further investigation since there might be limiting factors such as the lack of teacher professional development in technology integration that could be impeding teachers' efforts at leveraging upon ICT. In fact, Grabe (2001) notes that after an initial period of influx of computer hardware, schools have generally lagged behind the rest of society in following rapidly progressing trends of technology development. Goad (2012) pertinently argues that the incorporation of technology into teaching and learning has yet to catch up with the evolution of the technology itself. Research literature reveals that one of the key obstacles for the integration of technology into instruction has been the lack of professional development of teachers in learning how to apply technology in educational design and development (Schrum, 1999). Teachers' pedagogical beliefs have also posed problems in the full integration of technology in instructions (Ertmer, Ross, & Gopalakrishnan, 2007). Examining these issues in-depth in the context of Bruneian teachers involved in this study might help to address or alleviate the contributing barriers to capitalization of ICT and encourage these teachers to more effectively embed ICT in their teaching.

About 70 percent of headmasters indicated that there were staff in their schools who were in charge of ICT. Similarly, about 60 percent of teachers also indicated that there were staff in their schools who are dedicated to ICT implementation. Having staff who were dedicated to ICT deployment in school means that more streamlined and focused manpower support can be provided in the provision of ICT resources, maintenance and trouble-shooting. Such a move would address the constraints imposed by factors such as poor levels of technical support besides the lack of familiarity of ways in which technology can be integrated across the curriculum that have been cited as impediments to the quality of pedagogical leadership provided in implementing ICT-enriched learning (McGarr & Kearney, 2009). Having ICT support staff would then greatly encourage teachers to explore new ways of incorporating ICT in their instructional strategies without unduly being anxious or getting bogged down by technical glitches.

About two fifths of headmasters indicated that there were no special recognition or rewards for teachers who implement ICT in their teaching. About the same percentage of headmasters also indicated that to a certain extent the school provided rewards or special recognition for teachers who use ICT. The general practice seems to be to encourage teachers to use ICT in teaching whenever the need arises without any special reward or recognition being given. More tangible extrinsic forms of motivation would likely spur teachers to invest greater efforts in exploring embedding ICT to innovate their teaching rather relying solely upon intrinsic modes of motivation. As such Bruneian headmasters might be better positioned in catalyzing deeper penetration of ICT in their schools' learning environments if they devise incentives schemes that reward and recognize teachers who effectively exploit the capabilities of ICT to enhance teaching processes.

Table 3. Headmaster's roles in implementing ICT in education.

Headmaster's Roles	Percentage (%)	
	Headmaster (N = 64)	Teacher (N = 1130)
Strategic planner – plan the strategy for ICT implementation programme.	43.9	28.6
Supervisor – supervise or monitor teachers' use of ICT in teaching.	56.1	20.8
Motivator – encourage/influence teachers to use ICT in teaching.	74.2	57.3
Enforcer – facilitate/necessitate teachers' use of ICT in teaching.	54.5	32.4
Supporter – give moral support to sustain teachers' use of ICT in teaching.	60.6	45.3

The second research question was: What are the headmasters' roles in the implementation of ICT in education? As illustrated in Table 3, both headmasters and teachers agreed upon the centrality of the three roles headmasters can play in the diffusion of ICT implementation in schools: first as a motivator (74.2% headmasters, 57.3% teachers) who encourages and influences teachers to use ICT in teaching, then as supporter (60.6% headmasters, 45.3% teachers) who gives moral support to sustain teachers' use of ICT in teaching, and last as an enforcer (54.5% headmasters and 32.4% teachers) who facilitates or necessitates teachers' use of ICT in teaching. This feedback from headmasters and teachers emphasizes the critical role headmasters play in successfully leading, facilitating and sustaining ICT-driven educational initiatives in their schools. Teachers look up to them as mentors and motivators in promoting ICT-mediated learning in schools. Hence, a huge responsibility for the success of ICT-enabled programmes rests upon headmasters and they need to be confident of their own educational technology proficiencies in order to function as effective school leaders.

The third research questions were: What are the approaches to ICT implementation that headmasters adopt in their school curricular programmes?

The approaches to ICT implementation that headmasters adopted in order of preference and priority are:

(1) Approach B. Training master teachers, who then serve as resources for their colleagues (59.1%).
(2) Approach A. Developing technology-rich classrooms in which teacher expertise in various applications of technology can be developed and shared (53.5%).
(3) Approach E. Training administrators so they can serve as technology supporters and guide efforts within their schools or jurisdiction (43.9%).
(4) Approach D. Giving every teacher a computer, training, and time to develop personal confidence and expertise (39.4%).
(5) Approach F. Establishing teacher or technology resource centers, ideally with ease of teacher access through online services (30.3%).
(6) Approach C. Providing expert resource people from other staff, such as librarians, computer coordinators, or volunteers from business, parent, and students groups (27.3%).

Table 4. Cross-tabulation of headmasters' approaches to ICT implementation and teacher awareness.

Approaches to ICT Implementation	Percentage (%)		χ^2	p
	Headmasters' Approach	Teacher Awareness		
A. Developing technology-rich classrooms in which teacher expertise in various applications of technology can be developed and shared.	53.5	66.9	*9.17	0.027
B. Training master teachers, who then serve as resources for their colleagues.	59.1	61.0	1.19	0.552
C. Providing expert resource people from other staff, such as librarians, computer coordinators, or volunteers from business, parent, and students groups.	27.3	58.3	*24.3	0.000
D. Giving every teacher a computer, training, and time to develop personal confidence and expertise.	39.4	69.1	*23.8	0.000
E. Training administrators so they can serve as technology supporters and guide efforts within their schools or jurisdiction.	43.9	63.3	*12.5	0.002
F. Establishing teacher or technology resource centers, ideally with ease of teacher access through online services.	30.3	64.9	*33.4	0.000

From Table 4, the more popular approaches to ICT deployment in schools adopted by headmasters center upon peer coaching among teachers. Facilitating professional teacher-networks, both formally and informally where teachers with greater ICT expertise can share their knowledge and collaborate with teachers who might be less endowed with ICT skills appears to be a successful strategy in encouraging diffusion of ICT-enabled pedagogical practices.

It can be observed from Bruneian headmasters' responses that generally they operate in the higher order levels of ICT integration in educational settings. They possess the necessary skills and abilities in conceptualizing and applying ICT to create opportunities for teaching innovatively and within multiple contexts of task-oriented applied practice. They are able to seamlessly integrate ICT in their instructional techniques to situate ICT as an effective learning medium. This finding bears significant relevance since Stuart, Mills, and Remus (2009) have observed that the implementation of new technologies in becoming important to schools and the success of such implementations depend upon the presence of ICT champions. They found in their study that school leaders need to be ICT competent to be willing ICT champions.

The fourth research question was: How do headmasters' approaches to ICT implementation relate to teachers' awareness of the implementation of these approaches? Chi-square test for independence to determine if the variables, headmasters' approaches

to ICT implementation and teachers' awareness of these approaches are related. The chi-square test for independence compares the frequency of cases of headmasters' approaches to ICT implementation across teachers' awareness variable.

From Table 4, it can be observed that there are significant relationships between teachers' awareness of their headmasters' approaches to ICT use to headmasters' actual ICT implementation approaches: A (X^2 = 9.12, $p < 0.5$), C (X^2 = 24.3, $p < 0.00$), D (X^2=23.8, $p < 0.00$) , E (X^2 = 12.5, $p < 0.01$) and F (X^2= 33.5, $p < 0.00$). These results show that teachers are aware of headmasters' approaches to ICT implementation. This is an important consideration in the successful implementation of ICT in schools since there needs to be a fit between the ideas headmasters envision for their schools' ICT agendas and teachers' awareness of these ideas for them to be effectively executed at ground level. In this regard, Lucas and Valentine (2002) have noted from their research that the principal, by large exerts the greatest influence upon teacher collaboration and unity of purpose in fostering transformational models of pedagogy.

The last research question was: How do the headmasters' 1evel of ICT adoption relate to the teachers' levels of ICT adoption?

The levels of ICT adoption indicated by headmasters are ranked as follows:

(1) Fifth level where headmasters have adapted ICT to other contexts. They think about the computer as a tool to help them and are no longer concerned about it as technology. They can use it in many applications and as an instructional aid (42.4%; teachers also ranked this level as the first (22.8%)).
(2) Sixth level where headmasters become creative in applying ICT to new contexts. They can apply what they know about in technology in the classroom. They are able to use it as an instructional tool and integrate it into the curriculum (24.2%, teachers ranked this level as fifth (14.9%)).
(3) Third level of ICT adoption where headmasters understand and apply the process of ICT implementation. They begin to understand the process of using technology and can think of specific tasks in which it might be useful (18.2%, teachers ranked this level second (22.3%)).
(4) Fourth level of ICT adoption where headmasters are familiar and confident in ICT implementation. They are gaining a sense of confidence in using the computer for specific tasks. They are starting to feel comfortable using the computer (12.1%, teachers rank this level as third (19.0%)).
(5) Second level where they are learning the process of ICT implementation. They are currently trying to learn the basics. They are sometimes frustrated using computers. They lack confidence when using computers (4.5%, teachers ranked this level as fourth (17.0%)).
(6) First level which is being aware about ICT. They are aware that ICT exists but have not used it – perhaps they are avoiding it. They are anxious about the prospect of using computers (1.5%, teachers also ranked this level as sixth (4.2%)).

The chi-square of independence was used to determine if the variables, headmasters' and teachers' levels of ICT adoption are related. It compares the frequency of cases of headmasters' levels of ICT adoption with the teachers' levels' of ICT adoption. Table 5 shows that there are significant relationships between headmasters' and teachers' adoption of ICT in the second level (i.e. learning the process) ($X^2 = 7.34$, $p < 0.05$), and the fifth level of ICT adoption (adaptation to the other context) ($X^2 = 13.6$, $p < 0.005$). The results indicate that there is an adequate match between headmasters' and teachers' levels of ICT adoption. This is one area that school headmasters in Brunei might want to continually focus their attention on through the provision of staff professional development and trainings to ensure that teachers are on par with their own levels of ICT adoption to be able to strategically achieve desired ICT-driven educational goals. This is a critical area of consideration since it has been found that teachers tend to mainly focus on the development of technical ICT skills, whereas the formal ICT curriculum centered on the integrated use of ICT within the learning and teaching process (Tondeur, Van Braak, & Valcke, 2007). Headmasters need to ensure that this gap in focus between the proposed and the implemented curriculum for ICT is readily addressed to ensure the seamless and successful execution of the school's ICT strategic plan.

Table 5. Cross-tabulation of the headmasters' and teachers levels of ICT adoption.

Levels of ICT Adoption	Percentage (%)			
	Headmaster	Teacher	χ^2	p
Level 1 : Awareness I am aware that ICT exist but have not used it – perhaps I'm avoiding it. I am anxious about the prospect of using computers.	1.5	4.2	1.31	0.520
Level 2 : Learning the process I am currently trying to learn the basics. I am sometimes frustrated using computers. I lack confidence when using computers.	4.5	17.0	*7.34	0.025
Level 3 : Understanding and application of the process I am beginning to understand the process of using technology and can think of specific tasks in which it might be useful.	18.2	22.3	1.08	0.956
Level 4 : Familiarity and confidence I am gaining a sense of confidence in using the computer for specific tasks. I am starting to feel comfortable using the computer.	12.1	19.0	2.22	0.330
Level 5 : Adaptation to other contexts I think about the computer as a tool to help me and am no longer concerned about it as technology. I can use it in many applications and as an instructional aid.	42.4	22.8	*13.6	0.004
Level 6 : Creative application to new contexts I can apply what I know about technology in the classroom. I am able to use it as an instructional tool and integrate it into the curriculum.	24.2	14.9	4.5	0.100

6. Conclusions

The main focus of this research study was to investigate the approaches to ICT implementation adopted by school headmasters in Brunei to promote the use of ICT in teaching and their levels of ICT adoption. There are several implications that can be drawn from the findings of this study concerning the importance of schools' strategic plans for the implementation of ICT. It is evident that headmasters need to be explicit about schools' strategic plan so that teachers are made aware of it and be involved actively in achieving the vision and mission of the plan. Headmasters need to be aware of the strategies employed by teachers in the use of ICT in their teaching in alignment with their roles as motivators and enforcers of the strategic plans for ICT implementation in schools. Teachers need to be given incentives, or recognition for their efforts in making ICT as part of their teaching repertoire. The findings of this study also indicate that teachers expect provisions of funds for the use of ICT in teaching though headmasters have indicated otherwise. Thus, it might be a good idea for the Ministry of Education or headmasters within the limits of their jurisdiction to budget for funds that could be utilized in promoting ICT-enabled educational initiatives. Headmasters therefore need to analyze teachers' requirements, either in the form of funds or resources that are needed to support teachers' efforts at embedding ICT in their teaching. This supportive role of headmasters in ICT implementation plan needs to be actively endorsed by policy makers within the ministry. This study also voices both headmasters' and teachers' expectations in having technical or academic staff who are specialized in managing, administrating, and troubleshooting matters pertaining to ICT matters. Other supportive mechanisms pertaining to ICT implementation include professional staff development and sustained consultations in advancing ICT-related expertise. The other key finding of this study that headmasters operate at the higher levels of ICT adoption augurs well for the overarching drive of infusing technology within Bruneian schooling settings since it clearly shows that headmasters are ready to embrace the pedagogical affordances of cutting-edge emergent technologies and are prepared to fully implement these technologies in their schools to catalyze educational excellence.

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