

ICT Coordinators: Their Intended Roles and Architectures for Learning

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Abstract

This paper explores the roles of ICT coordinators, using architectures for learning as the theoretical framework to identify 1) the structures and mechanisms utilized to decide the role of a coordinator, and 2) those organized for the coordinator to realize a role within a school context of ICT-enabled, instructional reform. Data on ICT coordinator roles were collected from semi-structured interviews with ICT coordinators and colleagues as well as from school documents. The data were analyzed and coded according to elements of architectures for learning shown to influence instructional reform. The paper presents four cases of ICT coordinators with roles intended to provide instructional support, technical support, both instructional and technical support, and neither instructional nor technical support. By comparing architectures for learning associated with different intended roles, we find different conceptualizations of the ICT coordinator are connected to particular decision-making mechanisms and organizational units found in a school. We also uncover differences in architectures for learning organized for ICT coordinators intended to provide instructional support compared to those intended to provide technical support. The architectures for learning framework advances the importance of design to understand ICT coordinator roles. Using an architectures for learning framework in the design of an ICT coordinator role can be foundational to the successful participation of the role in instructional reform.

Keywords: ICT coordinators; architectures for learning; instructional reform; instructional support roles; organizational design

ICT COORDINATORS: THEIR INTENDED ROLES

Introduction

A core concern in educational policy and strategy has been to reform classroom instruction through the use of information and communication technologies (ICTs) (Kampylis et al., 2013). However, the literature has shown that teachers may lack sufficient knowledge and skills for ICT use and may possess attitudes and beliefs incompatible with ICT use (Hew & Brush, 2007). Besides, a teacher must learn how to orchestrate ICTs and classroom activities (Rogers, 2015). Consequently, teachers have identified the need for more support for ICT implementation, particularly, ongoing, practical and relevant professional learning (Skues & Cunningham, 2013).

One way that schools have supported teachers is through the ICT coordinator. We use the term ICT coordinator to denote a role that supports teachers to implement ICTs in classroom practice (Uluyol & Sahin, 2016). At present, while teachers may find an ICT coordinator is a necessary figure in schools (Moreira, Rivero & Sosa Alonso, 2018), the role may be poorly valued (McDonagh, 2011). This is because ICT coordinators provide primarily technical support to teachers (Lai & Pratt, 2004; Devolder et al., 2010; Skues & Cunningham, 2013; Rodríguez-Miranda, Pozuelos-Estrada & León-Jariego, 2014; Murphy, Allred & Brescia, 2017). There has been little evidence to show that ICT coordinators provide instructional support to reform teacher practice (Hashim, 2017). Nonetheless, the literature has shown a gradual, conceptual shift so that ICT coordinators have been envisioned as instructional leaders (McDonagh & McGarr, 2015). Murphy, Allred and Brescia (2017) found American school principals have expected ICT coordinator to perform more instructional support tasks including consulting with teachers to implement ICTs in the curriculum, providing ICT resources, collaborating to develop websites, and modelling effective ICT use.

Developing roles to provide instructional support in schools presents an ongoing challenge to researchers and practitioners, as these roles have often been constrained by a lack of thoughtful design (Resnick, 2010). The present study reports cases of ICT coordinators that have had roles explicitly intended to provide instructional support, technical support, instructional and technical support, and neither instructional support nor technical support. Our aim is to explore these intended roles, in terms of the structures and mechanisms utilized to decide each role, and the structures and mechanisms organized for an ICT coordinator to realize each role, within the context of ICT-enabled instructional reform.

Instructional Reform: An Architecture for Learning Perspective

We view everyday interaction in a school as dependent on and linked to the context of organizational structures, norms, and resources of schools (Little, 2012). Architectures for learning (AfL) refer to the structures and mechanisms mobilized within a school to enable and to constrain teachers' and colleagues' efforts to improve instruction (Hopkins & Spillane, 2015). AfL comprise structures, or, "shared rules and typifications that identify categories of social actors and their appropriate activities or relationships" (Barley & Tolbert, 1997, p. 96), and mechanisms serve as "points of leverage" (Wenger, 1998, p.249) whereby organizational learning is supported by the available organizational structure. AfL provide the contextualized support not only for individual teacher learning, but also for the everyday interactions that lead to widespread instructional reform. The research shows AfL elements can function as scaffolds to enable and to focus teacher interactions on instructional reform, particularly when elements are used and reproduced in everyday interactions between teachers and colleagues (Hopkins & Spillane, 2015). Studies have found that the extent to which teacher practices in a school change depends on AfL (Jackson and Cobb, 2012; Shirrell, Hopkins & Spillane, 2018).

An important analytical dimension of AfL is its design. The designed AfL refers to the intended work and responsibilities of people in the organization, and its elements include, "formally designated positions, chains of command, departments, programs, and formal organizational routines" (Spillane, Parise & Sherer, 2011, p. 588). The research has shown that while teacher learning cannot be forced, teacher learning can be facilitated by designing conditions and interactions for teacher learning (Stein & Coburn, 2008), and that AfL of schools may be reorganized to better support teacher professional learning (Jackson & Cobb, 2012). Based on the literature, we conceptualize the designed AfL as influencing the instructional reform that is realized in everyday interactions. Moreover, it is possible to identify the AfL elements that enable instructional reform. Since the AfL elements may cover a wide range of possibilities, we identify from the research four essential elements of AfL that influence instructional reform: structure and roles; organizational units; formal and informal structure; and decision-making mechanisms.

Structures and roles

Roles refer to the officially recognized social categories of individual actors in a school. Examples of roles are teacher, department head, principal and ICT coordinator. Schools design

ICT COORDINATORS: THEIR INTENDED ROLES

roles. They structure roles in hierarchical levels through different responsibilities and work that influence how people interact. A job description is an officially recognized presentation of a role's responsibilities and work.

Organizational units

Organizational units refer to groups of individual actors, with an emphasis on technical rationality and competence for the achievement of educational goals (Spillane, Shirrell & Hopkins, 2016). Organizational units in a school can include grade-level teacher teams and curriculum teams. Since instructional reform requires expertise and collaboration within and across organizational levels (Law, Yuen & Lee, 2015), an organizational unit can be a structure to interconnect roles in schools.

Formal and informal structures

Formal structure refers to officially recognized structure, such as grade-level teacher teams and teacher roles. While formal structure has been emphasized in American instructional reform, it alone does not facilitate instructional improvement. (Hopkins & Spillane, 2015). Therefore, the present study also examines informal structure, which refers to structure that is not officially recognized and may be self-organized, such as cliques and 'below the radar' work groups (Resnick, 2010).

Decision-making mechanisms

Decision-making mechanisms refer to the specific decisions that organizational units can make. They may enable or constrain instructional reform. Decisions made beyond the classroom level have important implications for classroom implementation of ICTs (Law, Kamylyis & Punie, 2015). Besides, interactions which result in material decisions, such as the use of new materials, the development of new routines, and changes to practices and beliefs are shown to contribute positively to instructional reform (Hopkins & Spillane, 2015).

Research Context and Objectives

In our literature review, we did not find any fine-grained examination of organizational units, roles and decisions that may be essential for instructional reform. At the same time, how a role that provides instructional support is embedded in AfL and how the AfL frame the instructional reform process for the role remain under-researched (Mangin & Dunsmore, 2014). Thus, our objective is to investigate within the context of school instructional reform through ICT implementation 1) the intended roles of ICT coordinators, 2) the AfL utilized to decide an

ICT COORDINATORS: THEIR INTENDED ROLES

ICT coordinator's intended role, and 3) the AfL elements organized for ICT coordinators to realize the school's approach. We hypothesize that a school creates a formal ICT coordinator role. The person who assumes the ICT coordinator role may decide with school stakeholders to intend the role to provide specific support, for example, instructional support or technical support. The ICT coordinator and other school stakeholders may allocate AfL elements that reflect the intended role. For example, an ICT coordinator intended for instructional support may be allocated organizational units and each unit may be a decision-making mechanism for instructional support. Each unit contains a certain number of people with specific roles in the school. The units and mechanisms may be formal or informal. Following the logic of inquiry, an ICT coordinator role may be ineffective in providing instructional support without appropriate AfL. Likewise, some ICT coordinators may not be as effective in providing instructional support as other ICT coordinators because of differences in AfL.

We use elements of AfL shown to influence instructional reform as our theoretical framework to design our study of ICT coordinators' intended roles and their designs within schools' AfL. The aim of the present study is to build empirical evidence of AfL that scaffold ICT coordinators' role as actors for ICT-enabled, instructional reform. Educators could then turn to a body of research on AfL for effectively designing an ICT coordinator role to provide instructional support.

Methodology

Using in-depth, qualitative case study methods we describe intended roles of ICT coordinators in instructional reform and the structures and mechanisms organized for the ICT coordinator's intended role, ensuring that data was collected about the structures and mechanisms utilized in the ICT coordinator design process. Our case unit of analysis was an ICT coordinator in a school and its structures and mechanisms up to the first six months of the role being introduced in a school. The four cases in this study were chosen to compare and contrast the different intended roles and associated structures and mechanisms of ICT coordinators.

Recruitment of Participant ICT Coordinators

Since ICT coordinators have different job titles and are not found in all schools, the first author recruited participant ICT coordinators through a community of educational technology practitioners. Four ICT coordinators agreed to participate in the study. They are given the pseudonyms Scarlett, Daniel, Sam and Steve (see Table 1). All are Caucasians, have teacher

ICT COORDINATORS: THEIR INTENDED ROLES

qualifications and have taught in more than one country. At the time of study, Scarlett worked at Aberdeen School in Hong Kong, and was new to Aberdeen school when she took up the ICT coordinator role. Daniel worked at Bowen School in Hong Kong, and had been a teacher at Bowen School before taking up the ICT coordinator role. Sam worked at Chester School in Singapore, and had been a teacher at Chester before taking up the ICT coordinator role. Steve worked at Darwin School, and had been a teacher at Darwin School before taking up the ICT coordinator role.

(Table 1)

The Study Context

In the process of gathering data for this study, we found that all participant ICT coordinators work in private international schools, which are largely self-contained schools operating free of government constraints (Friesen 2010), and are growing in numbers in Asia (Woo, 2013). Studying the AfL of ICT coordinators in private international schools afford two opportunities to advance knowledge. First, studies about ICT coordinators have been undertaken in national and sub-national mainstream education contexts such as New Zealand (Lai & Pratt, 2004), Belgium (Devolder et al., 2010), Australia (Tondeur, Cooper & Newhouse, 2010; Skues & Cunningham, 2013), Ireland (McGarr & McDonagh, 2013), Spain (Moreira et al., 2018) and the United States of America (Murphy et al., 2017), but to our knowledge no studies have been undertaken in an international, non-mainstream education context. Second, private international schools may show a greater variety of ICT coordinator AfL for case study exploration because they have greater structural flexibility than mainstream schools. Private international schools may be able to determine their language of instruction; pupil demographics; curriculum and examinations; higher education preparation; religion or philosophy; geography and facilities; student age range and grade-levels; private expenditure; and school fees (Yamato & Bray, 2006). As a result of education marketplace competition and structural flexibility, it stands to reason that a private international school may organize its structures and resources to reform classroom instruction through ICT implementation.

At the time of the study, the four schools varied in the number of campuses, school sections, student population, and number of classes per grade-level (see Table 2). These four schools showed similarities and differences in their strategic plans for ICT implementation and the AfL in place to support implementation. Aberdeen School focused its ICT implementation

ICT COORDINATORS: THEIR INTENDED ROLES

plans on its primary section whereas the other three schools had developed whole-school plans. Aberdeen, Chester and Darwin Schools were transitioning from Windows PCs to Apple hardware and software. They were also in the first year of introducing ICT coordinators in their schools, whereas Bowen School already had in place an existing ICT coordinator. Aberdeen School named their ICT coordinator role the ICT Facilitator, hired one person for the role, and deployed that person to serve in the kindergarten, grade-level two, grade-level four, and the religious studies subject area, all in the primary school section. Bowen School named their ICT coordinator role the Head of Teaching and Learning Technologies, hired one person for the role, and assigned that person to serve on the school's senior leader team as the only formal organizational unit membership. Chester School named their ICT coordinator role the Digital Literacy Coach, hired eight people for the role, and assigned one coordinator to each of the eight school sections. All the Coaches have equivalent roles, except for Sam, who was the only Coach to have membership in a school section curriculum unit. Darwin School created two ICT coordinator roles, the Educational Technology Coach and the Educational Technology Coordinator. The roles are not equivalent as the Coordinator has the responsibility of a Coach, with the additional responsibility to lead and to administer an organizational unit of Coaches in a school section. Darwin School hired ten people for Coach roles and three people for Coordinator roles and assigned each person to one of the thirteen grade-levels in the school. Steve is an Educational Technology Coach.

(Table 2)

Data Collection

Three sets of data were collected to understand ICT coordinators' intended roles and associated structures and mechanisms for instructional reform. The first set of data came from semi-structured interviews with each of the participant ICT coordinators. We conducted nine interviews, and each participant was interviewed at least twice during the study so that the participant could name formal and informal structures associated with the intended role. In the first interview with a participant, we asked a set list of questions (see Appendix 1) about the history of their ICT coordinator role (e.g. How did you become an ICT coordinator at your school?) We also asked questions about the policies, curriculum, performance appraisal aspects, and professional development programs that aid or hinder what they do. For follow-up

ICT COORDINATORS: THEIR INTENDED ROLES

interviews, participants were asked to provide details about the various structures and mechanisms in the school's AfL involved in the design of the ICT coordinator role.

The second set of data came from semi-structured interviews with at least one stakeholder who either interacted with the participant coordinator during the ICT coordinator design process or are familiar with the structures and mechanisms of the ICT coordinator's intended role. These stakeholders included the primary school section head and another ICT coordinator at Aberdeen School, a teacher and an ICT technician at Bowen School, another ICT coordinator and a teacher at Chester School, and one other ICT coordinator at Darwin School. These stakeholders were asked questions about the ICT coordinator from the semi-structured interview question list, and their answers were a means of methodological triangulation. The first author conducted all the interviews in person or by video conferencing. Each interview lasted at most one hour, was recorded with permission and transcribed.

The third set of data came from school documents related to school organization, curriculum, e-learning, and teacher professional development related plans, as well as ICT coordinator job descriptions. These documents were analysed to provide triangulation for the results of the analysis regarding the AfL from other data sets.

This study received ethical approval from an independent review board. Each participant was briefed about the study, their participation and rights, and have given written informed consent for their participation.

Data Analysis

All data were organized using Dedoose online software. The analysis began with the development of an analytical framework of the four key AfL elements from the literature review: structure and roles; organizational units; formal and informal structure; and decision-making mechanisms. We then applied content analysis (Joffe & Yardley, 2004) to the semi-structured interviews with ICT coordinators and developed a low-inference coding scheme. The coding procedures involved a constant comparative method (Stake, 1995), from which codes emerge in an iterative process of reading and thinking about the text (Lichtman, 2006). First, we coded organizational units because the elements of AfL are embedded within an organizational unit: (a) structure and roles; (b) formal or informal structure; and (c) decision-making mechanisms. We applied generic labels (e.g. teacher team; curriculum team) to organizational units and then coded the elements of AfL in the unit. We reified the coding scheme through a codebook based

ICT COORDINATORS: THEIR INTENDED ROLES

on guidelines set out in DeCuir-Gunby, Marshall and McCulloch (2010). Inter-coder reliability tests were performed: Cohen's Kappa for the organizational unit coding was 0.912; and 0.935 for decision-making mechanism coding.

We analyzed the coding results for the different elements of AfL to identify, first, the intended roles of ICT coordinators; second, the AfL utilized to decide each role; and finally, the AfL organized for each role. In the process of coding all data, we had found explicit decisions 1) to create an ICT coordinator role, 2) to assign the ICT coordinator a curriculum and pedagogical role, that is, instructional support responsibilities, and 3) to assign the ICT coordinator an ICT infrastructure development role, that is, technical support responsibilities. Therefore, to identify an intended role for the ICT coordinator for each case, we looked at whether any of these decision codes were found in case data. To identify the structures and mechanisms involved in the design process of the ICT coordinator role, we referred to the organizational units, structures and roles, and formal and informal structure coding associated with those decision codes for each case. To identify structures and mechanisms organized for the role, we referred to AfL element coding associated with the role. We identified all of the role's structures and mechanisms that were not exclusive to the design process. We also referred to excerpts from the qualitative data.

Results

From the coded data from four cases, we had found six types of organizational units to which an ICT coordinator could belong (see Table 3). We had found ICT coordinators could be grouped with roles typified as senior leaders, middle leaders and teachers (see Table 4). We had found ICT coordinators in formal and informal structures. We had also found 15 types of decisions that ICT coordinators could make from their organizational units (see Table 5). The results are now presented by case, according to the objectives of the study. The results of each case are presented in prose and in a table with codes corresponding to Tables 3, 4 and 5.

(Table 3)

(Table 4)

(Table 5)

Aberdeen School

Intended role and AfL utilized to decide role.

Scarlett has an ICT coordinator role intended to provide instructional support. We found the decision for a curriculum and pedagogical role for the ICT coordinator within Scarlett's AfL.

ICT COORDINATORS: THEIR INTENDED ROLES

The informal senior leader team with the school section head made the decisions not only for a curriculum and pedagogical role of the ICT coordinator but also for the role of an ICT coordinator. In separate interviews, the head of school section and Scarlett pointed to the absence of explicit curriculum, besides in the religious studies curriculum area, and high teacher turnover in the school for Scarlett's curriculum and pedagogical role.

Summary of ICT coordinator AfL elements.

Table 6 summarizes the AfL for Scarlett at Aberdeen School. Scarlett belongs to seven organizational units, including three teacher teams. Her organizational units include teachers from three grade-levels and the religious studies curriculum coordinators in her school section, the school section head, and the school head. She belongs to two, informal organizational units, both of which comprise senior leaders. The decision most often found (N=5) in the organizational units is content for teacher learning to be provided by ICT coordinator, followed by groups for ICT use and development (N=4) and mode of teacher learning for ICT use to be provided by ICT coordinator (N=4).

(Table 6)

Bowen School

Intended role and AfL utilized to decide role.

Daniel has an ICT coordinator role intended to provide technical support. We found the decision for an ICT infrastructure development role, and the decision against a curriculum and pedagogical role for the ICT coordinator within Daniel's AfL. The formal senior leader team made these decisions, and the decision for the role of the ICT coordinator. The other senior leader team members intended an ICT infrastructure development role for Daniel, but Daniel preferred a curriculum and pedagogical role. He said in an interview:

(The other senior leader team members') view was my job was really about the administration of resources and so long as I distributed resources in the right way to the right people, and by resources, I mean laptops, iPads, handouts, bits of money, if that's all I did, that was fine. And as long as I responded to any reasonable request on the back of an envelope, that's alright. Once I started questioning what they were doing with these resources, once I asked for evaluation reports, once I made it clear I expected tech integration to be in relationship with pedagogy and curriculum design, then there was big tension.

ICT COORDINATORS: THEIR INTENDED ROLES

Later in the interview, he added:

The one point I attempted to negotiate was that I should have some teaching and they were adamant that this (role) should have no teaching at all. In fact, they were very strong on that. So this was a question of, “If you want teaching, we won’t offer you the job.”

Summary of ICT coordinator AfL elements.

Table 7 summarizes the AfL for Daniel at Bowen School. Daniel belongs to three organizational units. His organizational units include heads of school sections, the head of school, and school directors. He does not belong to any organizational units with teachers or middle leaders. He belongs to two informal organizational units, one of which comprises senior leaders. ICT infrastructure development is the most often found (N=2) decision in the coordinator’s organizational units. Daniel shows the fewest decisions in the study as he belongs to three organizational units which can make only seven out of fifteen possible decisions.

(Table 7)

Chester School

Intended role and AfL utilized to decide role.

Sam has an ICT coordinator role intended to provide instructional support and technical support. We found the decisions for an ICT infrastructure development role and for a curriculum and pedagogical role for the ICT coordinator within Sam’s AfL. The informal senior leader team made these decisions, along with the decision for the role of the ICT coordinator. Sam’s curriculum and pedagogical role is unique amongst the ICT coordinators in the school. Sam said in an interview:

I kind of have my own personal job description now. I don’t think it has been adapted or incorporated into the college-wide job description of what (Digital Literacy Coaches) are expected to do, although I believe it should because the main thing that was missing from my perspective was pedagogy. There was no pedagogical centering to the job description. And I wanted that to be added because that is a big part of my job. And I don’t see why that shouldn’t be a part of every (Digital Literacy Coach’s) job but that’s where it gets very political.

In the same interview, Sam mentioned the decision for a curricular and pedagogical role, and for his membership in a curriculum team:

ICT COORDINATORS: THEIR INTENDED ROLES

...the things that he (a senior leader) accepted that I do that other (Digital Literacy Coaches) do not do. I work in the curriculum unit. I work with planning. Basically, most (Digital Literacy Coaches) are a very tech-centered job and my job is more curriculum-centered, which is what I think the job should be.

Sam's decisions for the coordinator role coincided with policy decisions, as he said in an interview:

Long story short, I fought it and fought it until they (the senior leaders) agreed. I negotiated a job description which basically said I will do this job on the condition we stop being IT teaching and start doing integrated technology.

Summary of ICT coordinator AfL elements.

Table 8 summarizes the AfL for Sam in Chester School. Compared to the other cases, Sam belongs to the most organizational units (N=9), and the most teacher teams (N=5). His organizational units include senior leaders, curriculum coordinators, ICT coordinators, and grade-level teachers. He belongs to one informal organizational unit with senior leaders. The decisions most often found (N=7) in the organizational units are groups for ICT use and development, and mode of teacher learning for ICT use to be provided by ICT coordinator, followed by content for teacher learning to be provided by ICT coordinator (N=6), selection of ICT skill for integration in the curriculum (N=6), selection of ICT tool for integration in curriculum (N=6), and selection of technical approach to adopt when using ICT (N=6). Notably, Sam's four, grade-level teacher teams make the highest number of decisions (N=10) out of all organizational units in this study.

(Table 8)

Darwin School

Intended role and AfL utilized to decide role.

Steve's intended ICT coordinator role is ambiguous. While we found the informal senior leader team had decided for an ICT coordinator role, we did not find that Steve's organizational units had made any decision for either a curriculum and pedagogical role or an ICT infrastructure development role. It is possible that the decision-making for the ICT coordinator role in the design process either has not been made explicit or belongs to organizational units to which Steve does not belong.

Summary of ICT coordinator AfL elements.

ICT COORDINATORS: THEIR INTENDED ROLES

Table 9 summarizes the AfL for Steve in Darwin School. He belongs to four organizational units, one of which is a teacher team. He belongs to more ICT coordinator teams (N=2) than teacher teams (N=1). His organizational units include ICT coordinators, the school section head and teachers from one grade-level in his school section. He belongs to one, informal organizational unit with the school section head. The decision most often found (N=3) in the coordinator's organizational units is mode of teacher learning for ICT use to be provided by ICT coordinator, followed by ICT infrastructure development (N=2), selection of ICT skill for integration in the curriculum (N=2) and selection of ICT tool for integration in the curriculum (N=2).

(Table 9)

Discussion

This article explores the institutional agency and scaffolds that may be necessary for ICT coordinators to provide instructional support within the context of ICT-enabled instructional reform. Specifically, we have used AfL as our theoretical framework to explore the structures and mechanisms involved in the ICT coordinator design process and that compose an intended role for ICT coordinators. Our research objectives have been to identify the intended roles of ICT coordinators, the AfL utilized to decide an ICT coordinator's intended role, and the AfL elements organized for an ICT coordinator to realize a school's ICT implementation approach. Four essential elements of AfL that influence instructional reform were analyzed: structure and roles; organizational units; formal and informal structure; and decision-making mechanisms. From four cases of ICT coordinators in private international schools, our findings contribute empirical evidence of AfL that scaffold ICT coordinators as actors for ICT-enabled instructional reform. In this discussion section we reflect on the empirical evidence and the application of an AfL framework.

First, by conducting a fine-grained examination of an ICT coordinator's designed AfL elements, we identified explicit decisions in ICT coordinator organizational units 1) to create an ICT coordinator role, 2) to intend the role to provide instructional support, and 3) to intend the role to provide technical support. As a result, we found cases of ICT coordinators intended to provide instructional support, technical support, instructional and technical support, and neither instructional support nor technical support. While our results agree with the existing literature insofar as there has not been consensus on how the ICT coordinator role should be defined

ICT COORDINATORS: THEIR INTENDED ROLES

(Devolder et al., 2010), and that ICT coordinators show multiple, realized roles (Lai & Pratt, 2004; Devolder et al., 2010; Rodríguez-Miranda, Pozuelos-Estrada, & León-Jariego, 2014), a clear difference in our study compared to the literature is that with an AfL framework we have connected the different conceptualizations of the ICT coordinator role to specific decisions and organizational units found in a school. The implication is that an ICT coordinator role can be explicitly defined within a school's existing structures and mechanisms for instructional improvement.

Second, in our examination of ICT coordinator decision-making mechanisms we found that only at Bowen School and Chester School ICT coordinators did work with school stakeholders to create an ICT coordinator role, to make the decision for or against the role to provide instructional support and to make the decision for or against the role to provide technical support. In all cases, only an organizational unit with senior leaders made one or more of these decisions. The implication is that senior leaders are necessarily important to decide ICT coordinator roles, and that ICT coordinators can work with senior leaders to decide the coordinator's intended roles. This is coherent with Law's (2000) recommendation that IT team leaders and members work together with principals at the school-level to implement ICTs through change strategies and goals, and Tondeur et al.'s (2010) finding that ICT coordinators' success in providing instructional support was influenced by the role's connection to school leadership.

Third, with an AfL framework, we compared and contrasted structures and mechanisms associated with different ICT coordinator intended roles. We have found differences in elements associated with ICT coordinators intended to provide instructional support, compared to those intended to provide technical support. In terms of organizational units, our study has found that ICT coordinators intended to provide instructional support belong to formal, teacher teams. Not only that, we have identified three unique ways to structure an ICT coordinator within teacher teams. Scarlett's ICT coordinator role at Aberdeen School belonged to one discipline-specific teacher team and three grade-level specific teacher teams within a school section. Sam at Chester School belonged to all four, grade-level specific teacher teams in a school section, and a teacher team drawing teachers from all school sections. Steve at Darwin School belonged to a grade-level teacher team in a school section. It appears that since teachers are situated in the classroom and a logical source of instructional leadership (Mangin & Dunsmore, 2014), it is necessary not

ICT COORDINATORS: THEIR INTENDED ROLES

only to group teachers together in organizational units but also to group teachers with other roles intended to provide instructional support.

Our study investigated the formal and informal structure of ICT coordinator AfL elements, and while formal and informal organizational units were found across cases, there was a difference in the number of formal and informal units organized for the ICT coordinator role intended exclusively to provide technical support compared to other ICT coordinator intended roles. Whereas at Aberdeen, Chester and Darwin Schools the ICT coordinator belonged to more formal units than informal units, at Bowen School, Daniel's ICT coordinator role belonged to more informal units than formal units. In view of Daniel's intended role to provide exclusively technical support, but the limited decision-making capacity of his formal organizational unit, informal structure can be the crucial scaffold for Daniel to provide not only technical support but also instructional support. In addition, across cases we only found evidence of ICT coordinator membership in informal units with senior leaders. The absence of finding informal units with middle leaders and teachers may be a limitation of the research methods, but we argue it evidences the importance of ICT coordinators to work with senior leaders in the ICT coordinator design process. Daniel's case, and the prevalence of ICT coordinators grouped informally with senior leaders evidence assertions that informal structure is an effective way to utilize school stakeholders' initiative and intelligence (Scott & Davis, 2015), and to utilize tacit knowledge in socially messy educational settings (Hung, Lee & Wu, 2015).

By identifying 15 possible decisions that an ICT coordinator's organizational units could make, and connecting intended roles to decision-making mechanisms, our study contributes to the literature on explicit decisions that scaffold an ICT coordinators role (Devolder et al., 2010) and that contribute positively to instructional reform (Hopkins & Spillane, 2015). Notably, it appears ICT coordinator roles intended to provide instructional support are associated with decision-making mechanisms for the content for teacher learning, and for providing classroom support. This study found the coordinator in Aberdeen School was intended exclusively to provide instructional support, and content for teacher learning to be provided by the ICT coordinator was the decision most often found in its organizational units; the coordinator in Bowen School was intended exclusively to provide technical support and the ICT infrastructure development decision was most often found in its organizational units; and the classroom support required from ICT coordinator decision was only found in teacher teams and only in

ICT COORDINATORS: THEIR INTENDED ROLES

Aberdeen and Chester Schools, where the ICT coordinators were explicitly intended to provide instructional support.

In summary, we argue that Sam's intended ICT coordinator role at Chester School appears best positioned to provide instructional support, as it is most connected to AfL elements shown to influence instructional reform. Specifically, it belongs to the most organizational units, and is most interconnected with hierarchical levels and roles in those units: we found units with teachers and middle leaders, and middle leaders and senior leaders. Sam also has the most decision-making mechanisms in the study. In contrast, Daniel's intended role at Bowen School seems best positioned to provide technical support, as it appears most disconnected from AfL elements. It belongs to few organizational units, with few hierarchical levels, roles, and decisions. Besides, Daniel's was the only role in the study intended to provide exclusively technical support.

Conclusion

The present study has shown ICT coordinators can have explicit roles in the context of school instructional reform through ICT implementation. It adopted an AfL framework to demonstrate that an ICT coordinator's role can be understood in terms of the structures and mechanisms associated with the role, and that it is necessarily important to design ICT coordinator roles with appropriate AfL elements to succeed in diverse school instructional reform contexts. This is not to say that an ICT coordinator's intended role will be realized exactly, just as any teacher learning cannot be forced but facilitated. However, we have argued an ICT coordinator's intended role within its designed AfL will frame the kind of support that the coordinator provides in everyday practice. Therefore, our study may be useful for educational practitioners. First, we recommend education policymakers and leaders create an explicit ICT coordinator role appropriate for a school's instructional reform scope. Second, to provide instructional support, ICT coordinators roles should be associated with formal organizational units of teachers and with decision-making capacity to provide classroom support for teachers and content of teacher learning. Third, ICT coordinators should work with senior leaders to develop such structures and mechanisms. Finally, ICT coordinators should self-organize structure to provide instructional support, particularly in contexts where the ICT coordinator role is not formally intended to provide instructional support.

ICT COORDINATORS: THEIR INTENDED ROLES

While the present work begins building a body of research on AfL for effectively designing an ICT coordinator role to provide instructional support, it has several methodological limitations. While the analysis is fine-grained, the participant sample is relatively small and self-selecting. Furthermore, the context for study is both narrow, as the ICT coordinators largely come from private international schools, and diffuse, as coordinators' schools are spread across two nations. The present work makes no claim that the ICT coordinator patterns are statistically generalizable across all private international schools, or across either nation represented. Since surveys have been a prominent method for making statistical generalizations about ICT coordinators in national contexts, we recommend survey research to make statistical generalizations about 1) ICT coordinators in private international schools, and 2) ICT coordinator intended roles and AfL elements. Besides, case study could be carried out on either a more representative of a more diverse sample of ICT coordinators.

Our study on ICT coordinator intended roles and AfL complements the literature on the realized roles of ICT coordinators. One area for further research is to examine how ICT coordinators realize their roles within AfL elements given their designed structures and mechanisms. This can be accomplished by comparing the AfL elements of an intended role with the AfL elements of a realized role. A second area for further research is to connect AfL elements to a school's instructional reform outcomes. In this way, it would be possible to identify not only an AfL element from an ICT coordinator's intended role in everyday practice, but the contribution of elements to instructional reform outcomes.

ICT COORDINATORS: THEIR INTENDED ROLES

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ICT COORDINATORS: THEIR INTENDED ROLES

Table 1

Participant ICT Coordinator Demographic Information

ICT Coordinator	Scarlett	Daniel	Sam	Steve
Sex	Female	Male	Male	Male
Country of origin	United Kingdom (UK)	UK	UK	Australia
First degree major(s)	Environmental science	Chemistry; education	Furniture and product design	Engineering
Countries where participant has taught	Colombia, HK, a Middle Eastern country, UK	Hong Kong (HK), UK	Malaysia, Singapore, UK	Australia, China, Japan, Singapore
Case school	Aberdeen School	Bowen School	Chester School	Darwin School
Years at case school before assuming ICT coordinator role	0	2.5	2	1
ICT coordinator experience at non-case school	Yes	Yes	No	No

ICT COORDINATORS: THEIR INTENDED ROLES

Table 2

Case School Structure Information

School	Aberdeen School	Bowen School	Chester School	Darwin School
Location	Hong Kong	Hong Kong	Singapore	Singapore
Number of campuses	3	5	2	1
Number of school sections	3	7	8	4
Approximate number of students	300	1,400	5,400	4,000
Number of classes in a grade-level (number of students in a class)	1 or 2 (20)	Not uniform	9 (22)	13 (22)

Note. School Sections refer to organizational structures comprising grade-levels, such as primary school, middle school and secondary school.

ICT COORDINATORS: THEIR INTENDED ROLES

Table 3

Organizational Unit Codes

Organizational Unit Code	Definition	Example Data Segment (Source)
Curriculum team	An officially recognized group of curriculum leaders, such as vice principals and grade curriculum coordinators who have direct impact on curriculum	As a member of the Primary Curriculum Unit (CU), attend all curricular meetings, including curriculum unit (CU), grade curriculum coordinator (GCC) meetings, grade level meetings, and other meetings as required by the VP for Curriculum. Work with the CU team to ensure consistency of practice around technology at each grade level, and across each grade level, including managing and developing the necessary tools to facilitate this, eg, scope and sequence documentation. (Chester School School document: Job Description)
ICT Coordinator Team	An officially recognized group comprising exclusively ICT coordinators in the school	"We have three ICT coordinators in our school (section), of which I'm one. I do second grade, and there's a first grade and a kindergarten coordinator. One of the guys is a team leader." (Darwin School Interview with ICT coordinator)
Parent Group	An aggregation (a gathering or formation) of parents in the school, with or without teacher and other leaders	"I reckon since the beginning of term, of the workshops I've run, I must have had 150 or so parents come. They're all the same ones." (Bowen School Interview with ICT coordinator)
Senior Leader Team	Any formal or informal organizational unit comprising interactions between the ICT coordinator and school section heads, and other school-level leadership or executives, including IT directors, and Head of school. Vice principals are not senior leaders.	"I used to say this (my job description) should be discussed as a (senior) team but that often came to nothing. I felt any discussion we (senior team members) had at senior team or other departments about this job were not taken that seriously." (Bowen School Interview with ICT coordinator)
Teacher Team	An officially recognized group of teachers, such as a subject panel or grade-level teacher team	"And another way that I build performance is, again, I do this, it's not in my job description, I expect every grade to build a collection of exemplars which specifically record how technology is being used in each grade level." " (Chester School Interview with ICT coordinator)
Technician Team	An officially recognized group of technical leaders, such as ICT technicians who primarily support the technical aspects of teaching with ICTs	"I meet D1, who heads up IT. R1 is the new recruit. Daniel introduces me to everyone. R1, along with R2, who isn't present, spend a lot of time in the classroom outside their traditional IT support role." (Bowen School Interview note with ICT coordinator)

ICT COORDINATORS: THEIR INTENDED ROLES

Table 4

Structure and Roles, and Formal / Informal Structure Indicators

Indicator	Code Type	Definition	Example Data Segment (Source)
Structure and Roles (Hierarchical Level of Leadership)	Middle leaders	Officially recognized categorical representations for people in schools. In an organizational unit, these people act neither as principals nor as teachers although they may be teachers in another organizational unit. Examples are ICT coordinators; literacy coaches; curriculum coordinators; grade curriculum coordinators; heads of grade; vice principals	"We (the ICT coordinator team) were actually discussing this yesterday at our edtech team which is the K-12 coaches and coordinators (ICT coordinators)." (Darwin School interview with another ICT coordinator in the school)
	Senior leaders	Officially recognized categorical representations for people in schools. In an organizational unit these people act as principals or heads or executives. Examples are Principals; head of school; head of school section; head of department (in Case B); IT director; administrator; head of campus; anyone on senior leadership team	"The major conflicts were with heads of department. These roles are school-level." (Bowen School Interview with ICT coordinator)
	Teachers	This role primarily interacts with students and directly impact students' learning in scheduled lessons. Examples are Grade-level and subject area teachers	"I'm working with six teachers: 2 kindergarten teachers; 2 grade two teachers; and 2 grade four teachers." (Aberdeen School interview with ICT coordinator)
Formal / Informal Structure	Formal	An officially recognized organizational unit; anything mentioned in official school documents	(The school) currently has full-time coaches in the area of educational technology (Darwin School document: Professional learning handbook)
	Informal	An unofficial organizational unit or clique; not mentioned in official school documents	So I'm thinking, "Someone's (a senior leader's) there, I had a conversation with someone who is in a position of power, who has gone into a board meeting, who has then passed that content on, but hasn't said, 'I was having a conversation with (this ICT coordinator) and his advice was...'" (Chester School interview with ICT coordinator)

ICT COORDINATORS: THEIR INTENDED ROLES

Table 5

Decision-making Mechanism Codes

Code number	Decision code	Definition	Example Data Segment (Source)
1	Classroom support required from ICT coordinator	Entering a teacher's lesson, be it to observe, to model or to co-teach	(The ICT coordinators) Support teachers in their use of technology in all curricular areas, including modeling and co-teaching (Chester School document: ICT coordinator job description)
2	Content for teacher learning to be provided by ICT coordinator	What about ICTs should teachers learn from the coordinator, such as basic ICT use (ICT coordinator provision can be indirect or by proxy through another school role, such as the principal, or another coordinator); this decision-type can be reactionary in the coordinator's work with an organizational unit; the content doesn't have to impact lessons	Provide training for students and teachers in low-level troubleshooting (Aberdeen School document: ICT Coordinator Job Description)
3	Curriculum and pedagogical role of the ICT coordinator	Assigning an ICT coordinator a teaching load (of lessons) or curriculum decision responsibilities; these responsibilities give greater weight or importance to the coordinator role	In fact, they (the senior team) were very strong on that. So this was a question of, "If you (Daniel) want teaching, we won't offer you the job." (Bowen School interview with ICT coordinator)
4	Groups for ICT use and development	Selecting organizational units, such as grade-levels, for ICT use	"We're (the principal and I) targeting kindergarten, grade two and grade four." (Aberdeen School interview with ICT coordinator)
5	Groups that the ICT coordinator will work with	Formally or informally assigning organizational units such as curriculum unit teams or teacher grade-level teams to the coordinator for work of any capacity; the assignment can also be to an individual within a group, but this decision must always be made by another group (for instance, senior leaders decided one coordinator should mentor another within the ICT coordinator team)	"So that was another reason why I got the point (the responsibility point and the pay increase) because the IT director looked at my case, and if you look at the document I sent you, those things at the top are the things that he (IT director) accepted that I do that other DLCs (ICT coordinators in the school) do not do. I work in the curriculum unit (team)." (Chester School interview with ICT coordinator)

ICT COORDINATORS: THEIR INTENDED ROLES

6	ICT infrastructure development	Which ICTs (hardware and software) to buy; administration of budgets and acquisitions of ICT. Also selecting physical spaces (venues) to enhance ICT use and development. ICT infrastructure development includes transitions to one computer to one student (1:1) transitions	"They (the senior leaders) also seek advice from us (the ICT coordinator team) at different times because they want to know what are budgetary requirements are for the next year." (Darwin School interview with ICT coordinator)
7	ICT infrastructure development role of the ICT coordinator	Assigning ICT coordinator exclusively responsibility to buy ICTs and administer ICT budgets	The major conflicts were with heads of department. These roles are school-level. Their view was my job was really about the administration of resources and so long as I distributed resources in the right way to the right people, and by resources I mean laptops, iPads, handouts, bits of money, if that's all I did, that was fine. (Bowen School interview with ICT coordinator)
8	Identification of Curriculum for ICT integration	Selecting either the formal curriculum program or curriculum unit in which to use ICT; delivering the curriculum in lessons is different from deciding to use it	"So I've been helping (the school section head). She wanted to take on the international curriculum project which is good. It provides the scope and sequence, absolutely. And rather than the PYP, which you have to understand and also the PYP can be quite restricting and overwhelming if you don't understand it, the international curriculum project is kind of like curriculum for dummies stuff." (Aberdeen School interview with ICT coordinator)
9	Mode of teacher learning for ICT use to be provided by ICT coordinator	In what formats should teachers learn about ICTs from the coordinator; formats include workshops; one-on-one; modeling; co-teaching; observing (ICT coordinator provision can be indirect or by proxy through another school role, such as the principal or another coordinator); classroom support is a specific mode of teacher learning for ICT use to be provided by ICT coordinator	"And it would often come down to professional development. They (the senior team) would go along with it, "Well, you've (Daniel) got to have some workshops on it,' but they only wanted as little as necessary. They didn't want to go further." (Bowen School interview with ICT coordinator)
10	Policies related to ICT use	Formal policies and plans on ICTs, including school institutional commitments and expectations, and ICT use policies	"They (the senior leaders) also want to get feedback as to whether or not they're (the teachers) using technology in the classroom or how they're using it. They want to know whether that part of the strategic plan is being followed." (Darwin School interview with ICT coordinator)

ICT COORDINATORS: THEIR INTENDED ROLES

11	Role of ICT coordinator	The decision to create the ICT coordinator role or deciding on hiring a coordinator or the criteria by which to hire the coordinator; this (can be) evidenced in negotiations about contracts or interview questions for other coordinators	So (the principal) said to me, "If you come to (the school) on a monthly of \$18,000, I will employ you." (Aberdeen School interview with ICT coordinator)
12	Selection of ICT skill for integration in the curriculum	Selecting an ICT skill, not a curriculum program or unit, and not a specific ICT hardware or software; skills include email, video editing, tables, spreadsheets, etc.	"And it's quite powerful because you can do an audit with a hundred teachers in fifteen minutes because I give out an A3 copy to each team, I say, "All you have to look at is your grade-level. You've got a green pen, yellow pen, red pen. Green: you're confident you do that. Your kids have done that skill. Yellow: they've done some; but you wouldn't feel it was enough. Red: you have no idea what that is; or they haven't done it at all." And very quickly afterwards I can do an analysis of that document and come up with areas that we can focus on for different grades for training or logistics." (Chester School interview with ICT coordinator)
13	Selection of ICT tool for integration in curriculum	Selecting a specific ICT hardware or software to use in formal teaching and learning practice, that is, the formal curriculum program or curriculum unit in which to use ICT	"For me, our (ICT coordinator) team's SMART goal is related to this blogging process. We're (The ICT coordinator team) doing a similar but different version of it in first grade." (Darwin School interview with ICT coordinator)
14	Selection of pedagogical approach/activity to adopt when using ICT	Using an ICT in a specific way for teaching and learning.	"So I tried to walk them (the teachers) through, "OK, this is how you (the teachers) would start this activity and this is how you would progress." No, it didn't work. So I realized they're (the teachers) not ready for that level of change. They're also in the SAMR model and they're not going anywhere. So I had to scale back my expectations and understand that with these two teachers, all I can do is one-off activities." (Aberdeen School interview with ICT coordinator)
15	Selection of technical approach to adopt when using ICT	The capacity to decide how to troubleshoot or solve ICT technical problems: in other words, deciding on using an ICT in a specific way to support teaching and learning, such as how to move Keynote from iPad to Mac.	"We have iPads predominantly with the kids. Even helping people to get used operating the iPads, I haven't done a specific training on this is how the iPad works, this is how to organize things. If you lose your work this is how you find it. So I'd like to do that." (Darwin School interview with ICT coordinator)

ICT COORDINATORS: THEIR INTENDED ROLES

Table 6

Aberdeen School ICT Coordinator AfL Summary

Organizational Unit	Formal / Informal Structure	Structure and Roles (Hierarchical Level of Leadership)	Decision Code Numbers
Parent group	Formal	Head of school section (senior leaders)	6
Curriculum team	Formal	Religious studies teachers; religious studies curriculum head (middle leaders)	
Teacher team	Formal	Kindergarten teachers	1; 2; 4; 9; 14
Teacher team	Formal	P2 teachers	1; 2; 4; 9; 14
Teacher team	Formal	P4 teachers	1; 2; 4; 9; 14
Senior leader team	Informal	Head of school section (senior leaders)	2; 3; 4; 5; 6; 8; 9; 10; 11; 13
Senior leader team	Informal	Head of school (senior leaders)	2; 6; 13

Note. Decision code numbers correspond to the decision code numbers found in Table 5.

ICT COORDINATORS: THEIR INTENDED ROLES

Table 7

Bowen School ICT Coordinator AfL Summary

Organizational Unit	Formal / Informal Structure	Structure and Roles (Hierarchical Level of Leadership)	Decision Code Numbers
Parent group	Informal	None	
Senior leader team	Formal	Head of school (senior leaders); head of school sections (senior leaders); executives (senior leaders)	3; 6; 7; 9; 11
Senior leader team	Informal	Head of school section (senior leaders)	4; 6; 8

Note. Decision code numbers correspond to the decision code numbers found in Table 5.

ICT COORDINATORS: THEIR INTENDED ROLES

Table 8

Chester School ICT Coordinator AfL Summary

Organizational Unit	Formal / Informal Structure	Structure and Roles (Hierarchical Level of Leadership)	Decision Code Numbers
Curriculum team	Formal	Curriculum coordinators (middle leaders); vice principal for curriculum (middle leaders)	4; 8; 12; 13; 14; 15
ICT coordinator team	Formal	ICT coordinators (middle leaders); ICT director (senior leaders)	2; 4; 9; 11; 12; 15
Senior leader team	Formal	Teachers; ICT coordinators (middle leaders); vice principals curriculum (middle leaders); ICT director (senior leaders)	2; 9
Senior leader team	Informal	Head of school section (senior leaders); ICT director (senior leaders)	3; 4; 5; 6; 7; 9; 10; 11
Teacher team	Formal	P2 teachers; P2 curriculum coordinator (middle leaders)	1; 2; 4; 6; 8; 9; 12; 13; 14; 15
Teacher team	Formal	P3 teachers; P3 curriculum coordinator (middle leaders)	1; 2; 4; 6; 8; 9; 12; 13; 14; 15
Teacher team	Formal	P4 teachers; P4 curriculum coordinator (middle leaders)	1; 2; 4; 6; 8; 9; 12; 13; 14; 15
Teacher team	Formal	P5 teachers; P5 curriculum coordinator (middle leaders)	1; 2; 4; 6; 8; 9; 12; 13; 14; 15
Teacher team	Formal	Teachers; ICT coordinators (middle leaders)	13

Note. Decision code numbers correspond to the decision code numbers found in Table 5.

ICT COORDINATORS: THEIR INTENDED ROLES

Table 9

Darwin School ICT Coordinator AfL Summary

Organizational Unit	Formal / Informal Structure	Structure and Roles (Hierarchical Level of Leadership)	Decision Code Numbers
ICT coordinator team	Formal	School ICT coordinators (middle leaders)	6; 9; 10
ICT coordinator team	Formal	Primary school section ICT coordinators (middle leaders)	2; 4; 6; 9; 12; 13; 15
Senior leader team	Informal	Head of school section (senior leaders)	11
Teacher team	Formal	P2 teachers	8; 9; 12; 13

Note. Decision code numbers correspond to the decision code numbers found in Table 5.

ICT COORDINATORS: THEIR INTENDED ROLES

Appendix 1. Semi-structured Interview Questions

1. Which policies, requirements and regulations, if any, have been instrumental in aiding or hindering what you do?
2. What suggestions would you make to school leaders for improving policies, requirements and regulations so that they would aid what you do?
3. Which aspects of curriculum at class, grade or school-level, if any, have been instrumental in aiding or hindering what you do?
4. What suggestions would you make to school leaders for improving curriculum so that it would aid what you do?
5. What were the significant negotiation points before you took on your job?
6. Has your job description changed since we last spoke?
7. Can everyone in the school access your job description?
8. Does the job description give you a scope for what you do?
9. Does the job description give other school stakeholders a scope for what you do?
10. Do you think the job description is important not only for you but also for other school stakeholders?
11. How was your job title determined?
12. How is your performance assessed?
13. What are reasonable criteria -- and format -- for appraisal were a line manager to appraise you?
14. Which aspects of your school's professional development program(s), if any, have been instrumental in aiding or hindering what you do?
15. What suggestions would you make to school leaders for improving the school's professional development program(s) so that it would aid what you do?
16. Are you active in or with professional organizations outside the school?
17. If so, how has your work with these external organizations been instrumental in aiding or hindering what you do?
18. How did you first hear about your school?
19. How did you become an ICT coordinator at your school?
20. Tell me about your career path and how you ultimately became a full-time pedagogical support specialist.
21. At what point and in what year did you go "off-table?"
22. At what point, if any, did you stop identifying as a teacher and began identifying more as an ICT coordinator?
23. Do you feel capable?
24. Do you consider yourself successful? Why?
25. Do you enjoy your work?
26. In what ways are your initial experiences at your school the same or different from your present experiences at the school?
27. In what ways are your experiences at this school similar to or different from your experiences at other schools?
28. What are your professional goals for the school, in terms of achievements and professional development in the school?
29. Which qualifications, if any, have been instrumental in aiding or hindering what you do?
30. If any, what did you study and where did you study?

ICT COORDINATORS: THEIR INTENDED ROLES

31. Do you come from a teaching background?
32. What kind of knowledge do you need to be a successful ICT coordinator?
33. How do you characterize your relationships with other school stakeholders, individually and even with bodies of stakeholders? (e.g. students; parents; staff)
34. What are these relationships like?
35. Talk to me about any conflict or tension experiences between you and other stakeholders in the school.
36. Tell me about your success experiences in the school.
37. Anything else that you would like to share?