An Investigation into Teachers' Perspectives of the Factors that Facilitate the Implementation of the e-CAL Curriculum Change Initiative in Trinidad and Tobago

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Abstract

In Trinidad and Tobago, there is a thrust towards technology integration into the curriculum as a means of improving student achievement. The one to one computing model was adopted in 2010 and the initiative is currently in its fifth year. The research study sought to discover the teachers' perspectives of the factors which supported their implementation of the initiative. Five teachers were chosen from secondary schools in Trinidad and Tobago. Data collection consisted of semi-structured interviews and an open-ended questionnaire. The findings revealed that factors critical to successful implementation of the eCAL curriculum change initiative were teacher-related (teacher belief, teacher collaboration and support); innovation-related (need and relative advantage), and contextual factors (availability and accessibility of technical resources and technical support, principal leadership and teacher training and professional development). It is hoped that the findings from this study would augment knowledge in the curriculum policy arena in the Trinidad and Tobago context.

1. Introduction

Education is acknowledged as one possible means of improving the economic status of a country and

thus, moving the country forward. Cutajar, Bezzina and James [1] concur that '[e]ducational reform and innovation are essential elements in the social and economic development of nations'. Improvement in education and increased student performance therefore remain areas of deep interest. Technology integration is viewed as one means of ensuring same (Bebell and Kay [2]. Therefore, in countries all over the world, educational reform initiatives target the integration of technology into instruction (Buabeng-Andol [3]). Trinidad and Tobago, a small developing nation state, is no exception.

Trinidad and Tobago's movement in this area of technology integration, as recorded at the secondary level, dates as far back as the late 1990s when the country, through its Ministry of Education (MOE), engaged in a number of endeavours to integrate technology into the curriculum. Among them are the Secondary Education Modernisation Programme initiative (1998), one main aim of which was technology infusion into curriculum; the development of a Draft Policy For Information and Communications Technology in Education (2005) and the development of an action plan, Target: 2015 Education for All (EFA) Action Plan (2007). The latest initiative was the eConnect and Learn Programme (e-CAL) – a curriculum change initiative which is aligned to four of the country's interconnected pillars for sustainable development: people-centered development; poverty eradication and

social justice, information and communication technology and a more diversified knowledge-intensive economy.

The e-CAL curriculum change initiative was introduced into the secondary school system in 2010 in an attempt to improve student performance through the integration of technology into the curriculum. The e-CAL is a one-to-one computing initiative through which every student on entering the secondary system, as a result of the Secondary Education Assessment placement examination, is given a laptop for use as a learning tool. The goals of the initiative are to:

- enhance the learning environment for students in an ever-changing information age;
- improve the quality of instruction and support the infusion of ICT in teaching and learning and the development of 21st century skills in students;
- reduce the inequity in access to computers and information between the students from wealthy and poor families;
- raise student achievement through specific interventions such as improving students' understanding through the use of education software;
- facilitate the development of collaborative teaching and learning between peers within the school, among schools and between teacher and student. (MOE [4])

The e-CAL curriculum change initiative consists of four major components: Physical Equipment, Connectivity, Educational System and Monitoring/Evaluation. The component, Physical Equipment, focuses on the supply and delivery of laptops and supporting equipment to all secondary schools in Trinidad and Tobago. The end goal of Connectivity is to provide a reliable, local wireless network structure within each school, enabling broadband internet connectivity within students' communities and bandwidth access, connection stability and the requisite technologies. The focus of Monitoring/Evaluation is to ensure feedback on the success of the project. Through Educational System, alignment of the technology with curriculum development is to be established, content created and appropriate training and pedagogical support made available (GORTT [5]). In the latter, attempts were made to prepare teachers for the implementation of the eCAL curriculum initiative. The goals aligned to this component were to improve the quality of instruction and support the infusion of ICT in teaching and learning and the development of 21st century skills

in students; to raise student achievement through specific interventions such as improving students' understanding through the use of education software; and to facilitate the development of collaborative teaching and learning between peers within the school, among schools and between teacher and student. (MOE [4]).

In most school-based curriculum initiatives, the teachers are the frontline implementers and are therefore significant actors who are pivotal in the implementation process. (Kin-Sang Chan [6]; Fullan [7]). When investigating teachers' perspectives of the implementation of curriculum change initiatives, more often than not the tendency is to focus on the barriers to successful implementation. (Chen and Selwood [8]). However, teachers' perspectives of the successful implementation factors of curriculum change initiatives are equally pertinent. The e-CAL initiative is in its fifth year, but there has been little attempt to gather from teachers their perspectives of the implementation of the initiative. Moreover, to date, there has been no comprehensive, empirical study into the factors which facilitate teachers' implementation of the eCAL curriculum change initiative in the Trinidad and Tobago context. This study therefore assumes that in some secondary schools in Trinidad and Tobago, success is being experienced in the implementation of the e-CAL curriculum change initiative and that this is worthy of investigating. Success in this study indicates that some teachers in several schools have begun and have continued to implement the curriculum change initiative. We acknowledge that curriculum change is challenging and can be experienced in varying degrees. We seek therefore to capture specifically the factors which facilitate the implementation of the initiative by teachers in the nation's schools.

2. Purpose of the Study

The purpose of this qualitative case study is to investigate teachers' perspectives into the factors which facilitate their implementation of the e-CAL curriculum change initiative in schools. The study will be conducted against the understanding, as stated in the eCAL programme policy (MOE [4]) that '[c]urriculum and instruction are at the heart of any educational endeavour as they determine what is taught and how' and that

'[t]he use of computers shall be integrated in subject areas identified by the school - as a springboard, for the development of the

lesson, for application and enrichment, as well as in the assessment of learning. (MOE [4]).

Overall, the intention is to capture pertinent details in regard to the implementation of the e-CAL curriculum change initiative; to provide direction to local policy decision-makers and implementers in regard to curriculum implementation and change and to augment the local knowledge base on curriculum implementation theory.

3. Research Questions

The overarching research question which guides the study is:

What are teachers' perspectives of the factors that facilitate the implementation of the eCAL curriculum change initiatives?

Arising from it are the following sub-questions:

1. What are teachers' perspectives of the teacher-related factors that facilitate the implementation of the eCAL curriculum change initiative?
2. What are teachers' perspectives of the innovation-related factors that facilitate the implementation of the eCAL curriculum change initiative?
3. What are teachers' perspectives of the contextual factors that facilitate the implementation of the eCAL curriculum change initiative?

4. Literature Review

Fullan [7] posits that there are nine interactive factors that influence implementation of educational change. These include the characteristics of change (need, clarity, complexity and quality); local characteristics (community, principal and teacher) and external characteristics (examination syndicate, funding agencies and Government). Fullan [7] further concluded that these factors can be either barriers or facilitators and that all these factors must work together to result in effective change. Specifically, in relation to one-to-one computing in the classroom, various contextual factors, innovation-related factors and teacher-related factors influence teachers' successful implementation (Balanskat, Blamire & Kafai [9]; Neyland [10]). This position is reinforced by Buabeng-Andoh [3], whose study revealed that there are both barriers and facilitators in teachers'

implementation of computer technology in teaching and learning. Similarly, his study found that facilitating factors range from the personal, the institutional to the technological. The personal factors included teachers' attitudes, knowledge and feelings, while the institutional factors were facilities, funding, training and support. Technological factors identified supported the fact that:

“teachers must perceive the technology as better than previous practice; consistent with their existing values, past experiences and needs; ease to use, can be experimented with on a limited basis before making a decision to adopt and finally the results of the innovation are visible to others”. [3].

Quality teacher training and professional development in technology is also a critical factor in successful integration of technology in the classroom. Mundy, Kupczynski and Kee's [11] research study, indicated that the teachers who took part in the “Dot USA's Teach UP!” technology training programme perceived that professional development in technology helped in their successful integration of technology in the classroom. Professional development, in their view, resulted in “a significant increase in the areas of student engagement, student excitement, students' acceleration of learning and student proficiency with computer technology” (Murdy et al, [11]). However, Sandholtz and Reilly [12] go further and argue that if teacher training programmes focus more on pedagogical technology training rather than technical skills, then teachers would better integrate technology in their teaching.

On the other hand, Garthwait and Weller's [13] qualitative case study investigated two Science-Math teachers' perceptions of the implementation of laptops in the classroom using interviews, classroom observations and teacher artifacts. They examined factors that were barriers as well as factors that facilitated teachers' use of laptops in the classroom. Findings revealed that a major factor facilitating the successful use of laptops in the classroom was their positive belief in the benefits of laptops in teaching and learning. This view is further reinforced by Ertmatr and Ottenbreit-Leftwich's [14] study that found that teachers who believed that the use of technology integration in their teaching would make it more effective, actually used it more in the classroom.

Teacher collaboration is also a factor in the successful implementation of one-to-one computing. Oliver, Mollette and Corn's [15] research on the

strategies that influenced the successful integration of laptops in middle and high schools in the United States, reveals that teacher collaboration was one of the factors that influenced teacher buy-in to the curriculum change. They noted though that various forms of teacher collaboration were important. These included teachers formally working in teams and sharing their views with each other on technology integration, informal collaboration where teachers shared their ideas with peers from other subject disciplines and teachers sharing their ideas through online communities. In a similar vein, Granger, Morbey, Lotherington, Owston and Wideman, [16] qualitative case study of four schools in Canada suggested that one of the factors that resulted in successful implementation of ICT in teaching and learning was teacher collaboration.

Availability and accessibility of technological resources and functioning infrastructure are critical factors in the successful integration of computers (Ottestod [17]). Technical support and assistance as well as the principal's support and leadership influenced teacher's use of technology in their teaching (Ottestod [17]). The principal's articulation of "a broad vision and a systemic approach of how to introduce and use the laptops [and] [t]heir breadth of vision [contribute] to the initiatives success" (Zucker & McGhee [18]). Petterson's [19] qualitative study of Swedish teachers' perception of the principal's leadership in relation to ICT use in their teaching from two different schools revealed that two types of principal leadership emerged, namely, distributed leadership and a formal type of leadership. Findings suggested that both types of leadership were significant in teachers' successful use of ICT.

5. Methodology

This research study is located within the sphere of curriculum implementation. A qualitative case study approach was chosen since it allows the researcher to investigate issues of concern in their classroom natural setting. The case in focus in this study was the e-CAL curriculum change initiative and the area singled out for intense scrutiny was facilitators of implementation, specifically teacher-related; innovation-related and contextual related factors.

Two methods of data collection were used: semi-structured interview and written open-ended statement (OES), adapted from Hall and Hord [20] Open-ended Concerns Statement. The semi-structured interview was deemed suitable because it is a means of

providing depth of information that is useful. Open-ended statements were paired with the semi-structured interview. The open-ended statement granted the participants the opportunity to communicate in writing their perspectives of the factors which facilitated the implementation of the curriculum change initiative. Their written submissions were used to corroborate the data gathered from the semi-structured interviews.

Permission was granted by the MOE to conduct research in the schools. The assistance of School Supervisors (SS) from the School Supervision Division was sought to identify schools in which the e-CAL curriculum change initiative was being implemented. School Supervisors are charged with monitoring curriculum implementation in the system and were therefore best placed to do so. Their identification of the schools ensured that the schools chosen were information-rich sites. A list of schools was generated but five (5) schools accepted the invitation to participate. One teacher from each of these five schools formed the sample. The teachers taught a range of subjects at different levels of the school system. They were all graduate teachers but only four were professionally trained - holders of a Postgraduate Diploma in Education. Their technology skills varied. Three had formal training in ICT and all had access to the informal training provided on-site by school personnel and by officials of the Ministry of Education. All were engaged in sustained attempts to implement the e-CAL initiative. We employed a code system to identify the five teachers: T1 to T5. In each case, T means Teacher. They were all informed about the study and each consented in writing to participate in the research.

Information from both the interviews and the written open-ended statements was transcribed and manually coded. From the codes, we unearthed the major themes and generated patterns. Linking the themes to the research questions, we developed rich, thick narrative, supported by *en vivo* quotes. From this narrative, we were able to identify the factors which the teachers perceived as facilitators to their implementation of the e-CAL curriculum change initiative. Further analysis was done to refine the information in order to determine whether they were teacher-related, innovation-related or contextual-related factors.

6. Findings of the Study

Research Question 1

What are teachers' perspectives of the teacher-related factors that facilitate the implementation of the eCAL curriculum change initiative?

Careful analysis of the data revealed that teacher-related factors played a critical role in the teachers' determination to implement the initiative. Foremost, the teachers' belief in the importance of the initiative propelled them to address the obstacles encountered and to make great effort to achieve the perceived goals of the initiative. The result of this was that there was continued implementation in spite of the challenges.

It [TEACHER BELIEF] is important because if, as the teacher, you do not embrace the technology, then you would therefore translate that to your students. So, for instance, if it is you go to the classroom and you are excited about the technology and you convey to the students the importance of bringing the laptops, the importance of becoming literate and so on, then they would catch it; it would be contagious.

(Teacher1, Interview 2014)

Initially, I felt I had to do it and I have to try it, but more importantly, I believe that it does have its use to students. It is beneficial to students' learning and development. It is an amazing technology, a very good step towards helping students in the twenty-first century.

(Teacher5, Interview 2014)

Teacher support and teacher collaboration also proved to be significant contributing factors.

As a school, as a staff, you know we would support one another, we would encourage one another. We would have our own internal training sessions where it would be necessary for all teachers to be technology literate so teachers would help one another. Within our department meetings, if a teacher used a particular software or tool and it was successful in the classroom, it would be conveyed to other teachers and we share as a staff.

(Teacher1, Interview 2014)

Our department would collaborate all the time. We set a wiki account where we would share lessons. We would also try new things

and push each other to make the lessons using the technology more interesting.

Sometimes one of us would teach a conceptual lesson and invite the other members of the department to see it. Our department had a good relationship and we shared four laptops among ourselves to help in the integration of technology in the classroom.

(Teacher4, Interview 2014)

In addition, in the responses given in the Open-ended Statement, Teacher 1 underscored the importance of collaboration among staff members about the different strategies/approaches to the use of the technology in the classroom.

Research Question 2

What are teachers' perspectives of the innovation-related factors that facilitate the implementation of the eCAL curriculum change initiative?

One major factor was that the teachers all viewed the initiative as serving a need. They acknowledged that the use of technology served to motivate students to learn and fostered their engagement in the teaching/learning process. It was a change that they embraced.

I thought it was important because, given the skills that were required for 21st century learning and survival, I think it was a very good initiative by the government.

(Teacher3, Interview 2014)

So it has its advantages; it is filling, you could say, that void where you stimulate the children, capture their attention

(Teacher2, Interview 2014)

The world has gone this way...our students need these skills, especially in such a technological advanced world. Very critical for their learning and creativity.

(Teacher4, Interview 2014)

Research Question 3

What are teachers' perspectives of the contextual factors that facilitate the implementation of the eCAL curriculum change initiative?

Continuous on-site training by members of staff with specific expertise provided the impetus to continue the implementation.

In the initial stages, ... the concentration was on the use of ICT in the classroom so we would have had that done internally by members of staff, the principal included; HODs showing us the way that they would teach a lesson, and how they would incorporate the technology. Subsequent to that, within our department meetings from time to time we would do training about the use of the technology in the classroom and how to plan a lesson.

(Teacher1, Interview 2014)

Within the school, we had internal department workshops where we shared lessons on how to use technology to teach. That helped a lot. The HOD even organized a workshop on a software programme called SynchronEyes which made me feel more knowledgeable and enhanced my teaching. These workshops ran often in the first two years and still continue to today. At the end of it, I did learn how to infuse technology into my Mathematics lesson

(Teacher 5, Interview 2014)

To supplement the on-site training, some teachers took charge of their professional development and sought other avenues through which to gain the competencies needed.

...then my own incompetency led me to participate in ... teachers' forums with people out of Trinidad where you would share ideas and collaborate. ... I found out a lot by talking to other people ... and then experimenting

(Teacher 3, Interview 2014)

Accessibility and availability of technical resources and the necessary infrastructure were critical factors which supported technology integration. Teacher 2 and Teacher 3 both indicated in the open-ended statement that proper functioning resources such as the

computer and the multi-media; internet access and availability of hardware and software for each of the subject areas served to provide the support needed for the successful implementation of the initiative.

Resources were available. We had plugs that worked; access to the internet at all times; a proper working system and infrastructure to accommodate teaching with technology. Classrooms were also well outfitted with a proper multimedia system.

(Teacher 4, Interview 2014)

... we have purchased lots of software to use. For example, in this little room here we have a TV, we have video, we have cable [cable television] with a multimedia projector so you get internet here. We would have ideas invested in this for ourselves and we have lots of educational videos and CDs and software that the teachers can use.

(Teacher 3, Interview 2014)

Principal support and leadership were fundamental to successful implementation. Teacher 5 pointed out that continued support by the Principal in the provision of software and hardware encouraged the teacher to integrate technology into instruction.

Initially, I was resistant to using the technology but the Principal motivated and encouraged me to use it ... The Principal was also very supportive and accommodating in providing resources that were needed. She also explained certain areas that we did not understand and helped us to get various lesson plans from the internet to help us and guide us.

(Teacher 5, Interview 2014)

... even in our staff meetings and so on, our principal would use the technology and she would always encourage the use of the technology. So therefore if you see the success of it, it is easier for you to want to use it also.

(Teacher 5, Interview 2014)

The principal also led from in front and championed the initiative.

The principal is fundamentally important because the principal is ... the one who would come and tell us that it is important for us to use it [the technology], it is necessary, it is mandatory and she wouldn't do it from the perspective that just because you have to do it because the Minister wants you to do it but from the perspective that ... it would be a success if we would effectively use it.

(Teacher 1, Interview 2014)

7. Discussion and Conclusion

The study sought to gain insight into teachers' perspective of the factors which facilitated their implementation of the e-CAL curriculum change initiative. The findings revealed that there were teacher-related, innovation-related as well as contextual factors which worked together to help teachers to confront and to conquer the technology integration challenge. This study therefore corroborates the literature on curriculum implementation. (Buabeng-Andoh [5]; Ottestod [18]). It became clear that at the core of the implementation of the curriculum change initiative was the teachers' deep belief in its importance in the system at this time and the possible positive influence it could have on students' performance. In addition, the teachers demonstrated support and collaboration in the sharing of resources and expertise among themselves as they strove to attain the goals of the initiative. Contextual factors also played a major role. One contributing contextual factor was the provision of resources. Having the necessary resources eased the burdens of implementation. However, the presence of resources had to be coupled with technical expertise which resided in a technician or in the teachers themselves who possessed ICT skills.

In addition the teachers were provided with training. Training was not only provided at the initial stage of the initiative but indeed was on-going and on-site. The latter factor suggested that the training was in keeping with the needs of the teacher and relative to their context and therefore was relevant and targeted. Furthermore, the principal played a key role in teachers' attempt to implement the e-CAL curriculum change initiative. The principal claimed ownership of the initiative and proved to be a motivating force. In addition, the principal provided the resources needed and made himself or herself available as a source of advice and direction. In some cases, the principal served as an exemplar. The findings also revealed that

innovation-related factors contributed significantly as well. Teachers were driven by an acknowledgement that there was need for the initiative. In the Trinidad and Tobago context, no one factor discussed in the paper is more important than the other. The facilitating factors worked together to enable teachers to integrate technology into the curriculum. This suggests that the technology challenge can be conquered if the necessary supports are in place to facilitate successful implementation

8. References

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