

RUNNING HEAD: AN ACTION RESEARCH STUDY AIMED AT DESIGNING AND IMPLEMENTING AN INNOVATIVE UNIT OF INSTRUCTION WITH THE CONTEXT OF DEVELOPING INNOVATIVE THINKING SKILLS AMONG PRIMARY SCHOOLS STUDENTS

An action research study aimed at designing and implementing an innovative unit of instruction within the context of developing innovative thinking skills among primary school students.

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Abstract

The purpose of this study is to use action research to investigate the effectiveness of the implementation of a unit that combines the design thinking approach and the new primary curriculum in the Trinidad and Tobago context. Data from multiple sources will be gathered and used to respond to the research questions. Data was collected through my research journal, student generated work and the researcher's observations of students during the implementation of the unit. The analysis of my research journal revealed ten factors that emerged as challenges to the implementation of innovative thinking in my classroom. Some of these challenges were teacher training, teacher confidence, teacher's beliefs about student's ability, postcolonial philosophy, learner's traits and teacher's misconception. An examination of participants and their work revealed that many of the participants exhibit many of the innovative attributes cited by the literature review. Two children displayed enough passion for their ideas that they actually developed and tested prototypes.

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Chapter 1: Introduction

Background

Innovation is the catalyst of long-term economic development and social progress; additionally, it is the key driver in the application of knowledge Looney (2009). Traditionally, commodities such as gold, coffee, cotton, and oil were high on the totem pole of economic value. Of recent, a higher premium is placed on knowledge. There is a seemingly direct correlation between knowledge and technology which has become a driving force in economic development. Looney has argued that rapidly advancing technologies is a driving factor for innovation and specifically innovation in education. Access to knowledge and technology wield power in the new millennium.

Friedman (2005) argued that both knowledge and technology wield power in the form of breaking down geographical borders, trade barriers and the like. World economies are once again subscribing to (Smith, 2007) proposition that when nations trade freely such nations benefit economically. Thus, when many of the economically powerful nations began to jettison their last vestige protectionist policies and gradually embrace the philosophy of free trade this signaled a significant paradigm shift. Imperfect competition reigned supreme and therefore nations are choosing to find ways to ensure that they developed comparative advantages with trading partners (Porter, 1998; Thiel & Masters 2014).

Over the last fifty years there has been a seismic shift in the economic superpowers that once dominated the global economic landscape. The MINT countries namely, Malaysia, Indonesia, Nigeria and Turkey can be counted among the growing league of economic superpowers (Page, 2015). These newly formed economic powerhouses have begun to encroach on the dominance of the developed world. Knowledge and technology platforms can be

arguably considered the driving force behind global information communication and technology (ICT) movement that has been transforming the developing world in this century.

Former colonies are now invited to sit at the trading table as equals with their former colonizers. It seems now rather ironic that centuries after Christopher Columbus proved that the world was not flat as he sailed the world in search of shorter routes to markets. Today ICT platforms has contributed to Friedman (2005) declaration in his book and title of said book- 'The world is flat'. Living in a flat world implies the rules have changed. Companies can outsource almost any department within their organization (research and development, accounting, or production) locally or even internationally at a relatively cheaper cost. Friedman essentially, argued that workplace routines has become the new developed world's enemy. Therefore, countries that are able to harness knowledge, replicate it and proved the technological support and breakthroughs are wielding power.

Friedman (2005) has coined this "Globalization 3.0" (p. 11). Globalizations 3.0 identified individuals and groups as the focus in creating a knowledge, technological and economic footprint on the world. The openness and interconnectedness that is facilitated by globalization 3.0 manifest itself into three fundamental ways namely, economic interdependency, information availability and movement, which can occur over vast distances and in essence can lead to the shrinking of the world into a global village Moahi (2007).

Nations are now actively pursuing initiatives that help create an environment that manifest innovative traits that can be harnessed to an economic or human reward. The concept of the ecology of innovation is steadily becoming a worldwide epidemic. Symptoms of this epidemic manifest itself in almost all sphere of society. In societies where an ecology of innovation is endemic particular markers exist. These markers are a predictable social structure,

free market and business culture that is disposed to risk and change. Also, such societies strive for and establish an education infrastructure that produces people who are globally aware and technically literate to harness the benefits of current technology (Marburger, 2011).

Innovation has contributed to the flattening of the world's economy. Economies in this century compete on a knowledge and technology platform. A country's capacity to harness the innovative thinking skills of its human capital then becomes paramount. My study seeks to find a place for the cultivating of innovative thinking among primary school students. This background will explore the global, regional and national attempts at harnessing innovative thinking. In addition, it will seek to provide an in-depth look into the educational ethos of Trinidad and Tobago.

The United Kingdom has taken a decision to cultivate a nation that is innovative. The Secretary of State for (Department for Innovation, Universities and Skills, 2008) has laid in parliament a White Paper which aimed to make Britain a premier country to conduct an innovative business or public service. This document outlines the British government's formal initiative to develop a plan to maximize the potential and talents of all its citizens, provision of a framework for all business to innovate and generally make Britain an attractive location for international organizations to invest. The components of the British plan involved establishing strategic alliances between governmental and non-governmental organization. Such alliances are critical to the creation of a culture of innovation in a society. The United Kingdom recognize innovation as being "essential to the UK's future economic prosperity and quality of life" (Department for Innovation, Universities and Skills, 2008 p. 13). Clearly Britain is attempting to establish and institutionalize an ecology of innovation in its country.

Barbados for instance has developed a Human Resource Development Strategy 2011-2016. In this strategic plan they focused on developing human capacity in order to have sustainable growth and economic development. Five critical pillars have been developed and will function as indicators and measures by which the country can be assessed in terms of its level of development. These pillars and their related objectives are outlined:

1. Enabling environment-Creating of an enabling environment for human resource development through institutional and capacity building
2. National Qualification- Development of an internationally-recognized national qualification framework
3. Demand Driven Education System- Improving educator preparation programmes, career planning, quality assurance, and active participation of youth at risk
4. Knowledge management systems - Rationalisation of knowledge management systems conducted and information access system developed
5. Research, Innovation, and Entrepreneurship capacity-Enhancement of research to improve innovation, and entrepreneurship capacity

The Barbados plan appears anchored in a sound basic education from which functional skills can be learnt by young citizens. A study of implementation plan showed that an alignment of the pillars to the attainment of critical sub-goals would indicate that Barbados have achieved an overall improvement in their human resource development. When this is coupled with an education system which seeks to engender pedagogy that is student centered. It builds a sense of community, engage students in cooperative and collaborative learning in an environment that embraces creative, critical thinking skills. Such pedagogy is an ideal setting for innovative thinking to be fostered across an entire generation.

Barbados plan has shown that Trinidad and Tobago is not alone in the region in their attempt to upgrade its citizenry. Once they are equipped, it is believed that they will be ready to carry their country through the 21st Century and beyond. The rolling out of Vision 2020 has been the first real attempt of widespread researched movement made by the government of Trinidad and Tobago. Vision 2020 plan was articulated clearly in the (Vision 2020 Operational Plan 2007-2010). This vision was built on five central pillars namely:

1. Develop Innovative People
2. Nurturing and Caring Society
3. Enabling Competitive Business
4. Investing in Sound Infrastructure and Environment
5. Promoting Effective Government

It was the goal of the government of the day to cultivate a knowledge society where its citizenry are able to harness and use information in order to nurture a culture of innovation. (Government of Trinidad and Tobago, 2006) The Vision 2020 Operational Plan 2007-2010 purports that such lofty goals can be achieved once we create a new kind of citizenry; one with “a yearning for learning” (p. 7). This ultimate goal became the basis for creating an ecology of innovation in Trinidad and Tobago. (Government of Trinidad and Tobago, 2006) The Vision 2020 Operational Plan 2007-2010 explains how an ecology of innovation can be supported by the creation of a “National Innovation System” where it is hoped the transformation of the national mind-set can be facilitated (p. 8). When the government of Trinidad and Tobago was changed many aspects of the Operational Plan 2007-2010 was jettisoned and in some cases repackaged.

In keeping the goal of developing an innovative people the ruling government in the period 2007-2010 outlined significant changes to the education system of Trinidad and Tobago. (Government of Trinidad and Tobago, 2006) Vision 2020 Operational Plan 2007-2010 outlined changes which involved the formal inclusion of the Early Childhood sector into the education landscape, changing the assessment process from knowledge to authentic knowledge and performance- at the primary school level. This change was signaled by a “call for the proposals for Infants to Standard one” curriculum, assessment and forcing the continuous assessment component to focus on science (p. 16).

At the secondary level the government of Trinidad and Tobago worked on rebuilding schools and reviewing the curriculum. At the tertiary level, a new University was established The University of Trinidad and Tobago (UTT) whose mandate was to provide skills training in areas traditionally not covered by the University of the West Indies. When the government changed in 2010 another initiative was introduced. This initiative was technology based. It was bolstered by a laptop programme. As well as the revision of the curriculum and funding for the modernization of Secondary Schools was continued. These are just some of the policy initiatives that are driving the need for this country to develop what is referred to as the ecology of innovation.

Within the Trinidad and Tobago context, governments have tried to transform the education system. Specifically, at the primary level there are many curriculum initiatives taking place simultaneously. Of interest to this study is a new curriculum initiative at beginning at the infant and standard one level with future expansion throughout the primary school. Even though, this initiative has its roots in the Vision 2020 Implemental Plan 2007-2010 remnants of it can be found in the new administration (Peoples Partnership, 2010) Manifesto Prosperity for all , 2010, which speaks to “Building the foundation for an intelligent nation and creative economy” (p .29).

This rebranding of sorts was refined in the Ministry of Education National Framework for Sustainable Development 2011-2015, (2012) documents which indicated widespread curriculum reform as one of the avenues that can bring about an intelligent nation and creative economy.

The Primary Curriculum Rewrite (PCR) is the latest curriculum initiative undertaken by the Ministry of Education. This curriculum framework can be described as an integrated thematic approach to teaching and learning. Learners are engaged in an active process that can cultivate a love for learning that will hopefully plant the seeds of discovery learning. The curriculum focus integrates nine core subject areas which include Value and Citizenship Education and Foreign Language awareness. These can be considered as new subject areas that are infused with Information and Communication Technologies. Old areas such as Visual and Performing Arts and Physical education has also been included the (Curriculum Planning and Development Division, 2013). Quite significantly Literacy and Numeracy has been built into all subject areas. PCR is a curriculum framework as such it seeks to outline the principles that should govern teaching and learning experiences at the primary school. To appropriately implement PCR teachers must actively take on the role of curriculum designers at the classroom level. To support teachers the framework has been divided into three main components namely, Subject Guides, Teacher's Guide and an Instructional Toolkit (Curriculum Planning and Development Division, 2013). Teachers can use these three component to develop activities and assessment formats that are relevant and appropriate for their individual classrooms.

As this integrated thematic curriculum unfolds it is hoped that these young citizens will be introduced to learning traits such as dispositions, skills and capability. These learning traits bolster the edifice of a national ecology of innovation. In such a quest for the creation of a national ecology of innovation curriculum content and pedagogy have become paramount. A

reconstitution of the national definition of learners can occur when traditional modes of teaching and learning are jettisoned. In lieu of the aspirations of Vision 2020 and its replacement document- Prosperity for all, our education system should generate young citizens who are capable of sustaining an ecology of innovation. However, laudable as this curriculum initiative stands one cannot discount particular features of Trinidad and Tobago society that can impede these aspirations.

Chiefly, the basic structure of Trinidad and Tobago's society and specifically its education system is very postcolonial. Postcolonialism embodies slavery, indentureship and the like. Such experiences left a stain on the fabric of all facets of society, which includes the current education system. Postcolonial societies were triggered by colonialism and its lingering manifestation of cultural, political and linguistic effects reverberated decades after colonizers have physically left the colony Polak (2005). Thus, when one considers Polak (2005) definition of Postcolonial as "all the culture affected by the imperial process from the period of colonization onwards" (p. 136) the influence of colonialization become more apparent. Additionally, (McCarthy & Sealey-Ruiz, 2010) argues that educators need to understand that the structure of postcolonial societies are designed to maintain hegemony.

As a result of this influence, there are many structures in the society that reflect the hegemonic ideology of colonialism that has infiltrated the economy and education, Bristol (2012). These structures that speak to imprisoning the daily practices of teachers into neoliberal initiatives of accountability, governance and programme performance. Therefore, the concept of plantation pedagogy as introduced by Bristol takes on a new understanding of the pedagogy dispensed in the classroom. It has been argued by Bristol (2012) that Plantation Pedagogy is a form of "educational practice manifest within the classroom in a postcolonial setting like

Trinidad and Tobago” (p. 3). Bristol explained that this educational practice is continually involved in a cultural critique of contemporary archetype of a plantation. My personal observations of schools where I have worked and visited lends support to the concept that some schools are a contemporary archetype of a plantation. In these school I have observed that the pedagogical strategies employed are teacher centered and controlled.

One then can begin to understand the impact of the historical antecedents of a teaching practice that is so directed by a command and control culture. The metaphorical plantation speaks to the socio-cultural context of the educational. Bristol (2012) described a teaching practice context that is both oppressive and intellectual subversive. Bristol’s point of view seeks to explain the need of some teachers to dominate their classrooms and students. Based on my observations I can say that the prevalence of the teacher centered approach is rampant. Some have taken the argument even further to link this type of pedagogy with the unspeakable belief in the need to control their class by engaging in corporal punishment. It would appear almost impossible for innovative thinking to flourish in an education systems where its archetype is that of a plantation. Plantation pedagogy as described by Bristol appears to be diametrically opposed to the tenants of PCR and the fundamentals of innovative thinking. The practices involved in the plantation pedagogy will only stymied innovative thinking and many of the constructive pedagogical practices embedded in PCR.

Another remnant of our postcolonial pass is a seemingly inherent need for our society to separate and brand schools particularly at the secondary level as prestige, acceptable and the others. In spite of a rebranding and restructuring of the Junior Secondary into Senior Secondary, the stigma remains. This assumption is support by De Lisle, Seecharan and Ayodike (2009) who explained that “postcolonial systems were elitist rather than egalitarian” and as such “elitist

systems are designed to select and sort” (p. 6). Thereby, these inequalities are perpetuated by the competitive nature of the education system. There is a culture of examinations that appears to add to society’s acceptance of the inequalities in the system. This culture of examinations appears to justify the focus on assessment not as learning or assessment for learning but assessment for placement and labelling. Adding an examination culture to the milieu of a plantation pedagogy will only serve to further suffocate hopes of cultivating innovative thinkers. These are just some of the factors that has driven my need to engage in action research and explore a possible solution to the problems in the education system that elk my consciousness.

In an education system where from nursery to tertiary the focus is on ‘passing examinations’ then it will be difficult for teachers to take the time to scaffold learners. Conversations with fellow teachers revealed that they are teaching to test and not for the cultivation of a love for learning far less for innovative thinking. Even teachers at the standard one level complains that they spent the last term preparing children for their first national standardized test. These student ages range from seven to eight years. Assessment for and as learning, requires a different mind-set and pedagogy which require both active engagement as well as time for scaffolding and high quality teacher designed formative assessments. This research study has been designed to bring this concept into formative assessment as a pedagogical tool to reality. Via the design thinking approach and PCR I am hoping to find an opportunity to package innovative thinking skills in a format that can be easily replicate.

With specific reference to peer and self-assessment, both speak directly to teaching and learning paradigms that actively engage learners as well as supports innovative and creative thinking. The metacognition that occurs allows students to take ownership of their learning processes. By turning the power over to students, (Black & Wiliam 2009) stated that teachers

can help the “development of students’ own capacity to learn how to learner and to learner autonomy” (p. 8).

The design thinking approach has been prospered to help foster innovative thinking. Razzouk and Shute (2012) defined design thinking as “an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback and redesign.” (p. 330). It is an approach that provides the context to allow teachers to relinquish their power. As an approach to pedagogy design thinking emphasizes the development of children’s creative confidence through hands-on projects that emphasizes empathy, promoting a bias for action, ideation and fostering active problem-solving skills and competencies, Kwek (2011). Internationally, design thinking has been studied at both the tertiary level and elementary level. My interrogation of the literature revealed that design thinking functioned as a complement to existing curriculums. It also supported the learning initiatives that were taking place in the schools in which it was being implemented. It will be of interest to observe the effectiveness of the design think approach in the Trinidad and Tobago context.

PCR has significant benefits that cannot be deemed as frivolous and ignored. PCR allows teachers to take a multiple disciplinary approach to bridging resources, real-life issues, discussion, guided inquiry, and subject content knowledge into a package that facilitates critical problem solving, and possible divergent thinking (Curriculum Planning and Development, 2013). The benefits of PCR can be enhance by the use of the design thinking approach. Design thinking challenges students to take real life issues and seek solutions. In the finding of solutions learners will be engaged in guided inquiry and lively discussions. Ensuring subject content knowledge is part of the design thinking approach will be guided by the competence of the teachers. Kwek (2011) cited research that argued that integrating design thinking into academic

content “is a powerful tool for learning”, as “it can support a diverse range of interdisciplinary academic content” (p. 5).

Should design thinking be integrated within PCR educators can help student develop a skill set that involves creative confidence (creative knowledge, skill and mindset) and problem solving from the heart of the issue (Kwek, 2011). Kwek went on to cite countless research that support “immersing the learner in processes which encourages them to demonstrate divergent thinking” because “creative thinking produces differentiated patterns of activity across multiple brain region” (p.5). These findings have significant value as they will help educators not only to successfully integrate design thinking with PCR but help students derive the benefits of PCR. These benefits most likely will not be fostered within the context of the traditional school setting.

Both Design Thinking and PCR requires that teachers have a lucid understanding of how to facilitate learning across content areas. The horizontal and vertical movement along and across content areas facilitate transfer of learning. Ensuring teachers of the PCR curriculum have a true understanding of the nature and implementation of an integrated thematic approach to teaching can be enhanced by successful implementation of design thinking. It then becomes imperative that teachers be provided an opportunity to actively explore the various learning opportunities that can occur when design thinking is successfully implemented and complements the delivery of PCR.

PCR integrated with design thinking can provide regular teachers with a framework for cultivating innovative thinkers. Getting young citizens ready to respond to global imperatives has been mandated by successive Ministers of Education. Apart from preparing our young citizens to take up jobs or be creators of jobs in the 21st century, design thinking with PCR can provide the platform to cultivate a sense of empathy. By learning to put people first and observe the

world in minute detail (Brown, 2008). Secondly, design thinking allows students to imagine and actively pursue solution; be collaborative and cooperatively engaged in a design challenge that encourages them to seek the interest of others (Kwek, 2011).

Going to the PCR workshops did bring a measure of hope that the new curriculum will kindle a curiosity and love of learning that seems to have been snuffed out of the education system. Nonetheless, conversations with teachers at workshops and colleagues who should be implementing PCR across the country indicated to me the following: some were not implementing PCR at all, some said that they did not understand PCR, while others said that they will attempt it eventually. Most of them indicated that they have not changed their traditional pedagogical practices. Lack of change in pedagogical practice among some of my colleagues and the seemingly rapid decline in the use of nontraditional teaching techniques compelled me to search for a solution. This study will indicate if design thinking combined with PCR can help learners sharpen their innovative thinking. Innovative thinking breathes creativity, problem solving and collaboration. If such skills are packaged with an analytical and creative approach as design thinking then fostering an ecology of innovation could become pervasive.

Another issue that was highlighted from my conversations with colleagues is teacher training. Teachers expressed the view that they should be supported in their attempt to navigate a new curriculum. Also, teachers should be provided with an authentic means of teaching and assessing both the academic and non-academic task. Having an authentic platform for integrating these issues into all aspects of teaching and learning has become an imperative. Design thinking provides the backdrop for an authentic forum to design, implement and assess curriculum enactment. As a former manager of a teaching staff I am fully aware of how difficult it is to implement change. Primary Teachers within the last two years have undergone significant

curriculum change. Curriculum change is generally contrived with little or no direct input from the actual persons implementing the change. Change is dynamic and probably one of the few constants in education. The inevitability of change can be a daunting prospect for its implementers. Fullan (2007) has strongly advocated for the need to examine the change processes and understand the need to allow teachers to not only voice change concern while they are navigated through the process. PCR in itself seems to have been a source of stress to teachers in my school. My informal discussion with peers from other schools revealed similar sentiments.

PCR is a radical departure from the traditional subject centered stand-alone type of curriculum that many teachers have been trained to deliver and have grown accustomed. The use of the design thinking approach as a complement to PCR can provide a safe means to support teachers. This support will help to facilitate the vast amount of transfer learning that occurs as children become actively engaged in their design challenge.

Statement of the Problem

Looking at the local environment there is not enough data to support combining design thinking approach with PCR. There is not enough information to neither support nor refuse the claim that design thinking approach can be combined with PCR to foster innovative thinking. Therefore, this study will provide the data that can form the basis for an in-depth investigation of what can happen in a primary school classroom in Trinidad and Tobago should design thinking approach is combined with PCR and implemented.

This becomes imperative because it addresses a number of issues that relate to the problems that appears to be hindering innovative thinking in our primary education sector. Firstly, the seemingly unconscious acceptance of teacher dominated pedagogical practices and a command and control classroom ethos. Also, the perpetuation of an elitist system which nurtures inequality. This inequality is masked behind a very competitive exam culture that sorts and selects students. These are legacies of our nation's colonial pass. This legacy appears to have created and unspoken acceptance of traditional pedagogical practices. These traditional practices are contradictory to the tenants of innovative thinking.

Secondly, previously teachers from the primary system have been trained to deliver the curriculum as isolated subjects. Currently they are expected to deliver a new integrated curriculum packaged as thematic units. Such significant curriculum changes requires adequate training. Yet teachers received only one day workshops per subject in some instances. Integrated thematic curriculums have their own intricacies. To deliver them adequately teachers need to have a lucid understanding of how to integrate and effectively deliver these nine core subjects within the PCR package.

Research by (Min, Rashid & Nazri, 2012) found that teachers' understanding and practices regarding thematic curriculum approaches were significantly correlated. Hence, (Min et al., 2012) specifically found that teachers' understanding of thematic approach will influence the teachers' confidence to use this approach in their daily classroom teaching. The research of (Min et al., 2012) is quite critical because some primary school teachers in Trinidad and Tobago have not been specifically trained in integrated thematic curriculum, thematic teaching methodologies and as such their level of understanding regarding the implementation of PCR can be considered questionable at best. Also, (Min et al., 2012) reported on research that indicated that inadequate

training will negatively impact teaching, because proper training “prepare teachers to make the transition from an isolated subject-based curriculum to a more integrated one” (p. 275). These findings have serious implications for the Trinidad and Tobago Primary Education sector. PCR requires a paradigm shift for teachers. It requires that teachers move away from the familiar - teaching in subject silos to the virtually unknown- thematic teaching.

Both, problems if left unabated will hinder the fostering of an ecology of innovation. To compound the problem global economic trends are changing. The workforce has changed. There is now a demand for both academic and performance based skills. Termed 21st century skills these performance behaviours require employers to select employees who possess the relevance skills for global survival, regardless of their nationality. These individuals have been schooled in art of collaboration, understands universal standards, solving nuanced problems, sensitive to and can imagine multiple perspectives of the world and have a globally focused and view point (Brown, 2008; Kwek, 2011; Dalsgaard, 2014). These skills have now become acute with the implementation of free movement of CARICOM nationals in the CARICOM Single Market and Economy. If our educational system does not change to meets the growing global knowledge and innovative economy we as a people will be left behind grasping at the claws of a postcolonial.

Purpose of the study

The purpose of this study is to use Action Research to investigate the effectiveness of the implementation of the design thinking approach in the Trinidad and Tobago PCR context. In determining the effectiveness one will examine the teaching strategies and the degree of changes in student’s innovative thinking skills in a given learning context. In so doing, assess possible

adjustment that can be made to facilitate the incorporation of the design thinking approach into integrated thematic and assessment planning that is required for effective delivery of PCR.

The significance of the study

This study is significant because it provides a context to examine how effective design thinking as an approach can develop innovative thinking in learners. Under experimental conditions the elements of design thinking can be delineated and its relevance assessed in the implemented of design thinking. A review of the data on design thinking mainly seem to speak to its effectiveness but the model has not been tested in the Trinidad and Tobago curriculum and pedagogical contexts. Therefore, this study is quite significant as the pedagogical requirement for the effective implementation of design thinking will be assessed and hopefully provide the basis for future more in depth studies. Also, design thinking has been purported as an approach that can be done in collaboration with an existing curriculum initiative.

(Curriculum Planning and Development, 2013) ‘The new curriculum is new to our education system’ (p. 15) change can be difficult to accept and manage for its implementers. Teachers have been found to be a critical success factor in education change efforts and as such must be supported during the process (Abdul-Majied & Cain, 2013). Teachers at the primary level will have an approach in Design Thinking to support their attempts at implementing their thematic units that can aid in as assessment as learning for both student and teacher.

Research Question

1. What challenges would be derived from implementing a unit that combines the design thinking approach with PCR.
2. How would Design Thinking impact student innovative thinking?

Organization of the Paper

This study comprises of six chapters. The first chapter introduces the study. It outlines the background that speaks to the genesis of the study. Also, this chapter examines the international, regional and local conditions that have influenced innovation topic. Within this chapter of the study an exploration of the problem, its purpose and significance were expounded upon. In addition the research questions were also outlined.

Chapter 2 delineates the literature review. This literature review provides the reader with a thorough exploration of the nature of the topic of innovation and its theoretical framework, the design thinking approach, upon which this study rest. Relevant information regarding the current educational context, namely current curriculum model. As well as the nature of the children in which the design thinking approach has been implemented.

Chapter 3 contains a detailed description of the methodology that has been utilized for this study. An examination of the choice of methodology, justification of the sampling strategies, data collection and analysis are outlined. Also, the strategies used to preserve the integrity of the study as well as the limitations and delimitations are also defined here.

Chapter 4 outlines the rationale that supports unit that has been implemented in this study. It also provides an outline of the actual unit and lessons that were implemented during this action research study. Chapter 5 lays out the presentation of the findings and a concise analysis of the data gathered.

This study ends with chapter 6. Chapter 6 offers a discussion on the findings of the research and makes recommendations regarding the implementation of combining design

thinking approach and PCR. Suggestions for further research are also located in this final chapter of the study.

Chapter 2: Literature Review

Introduction

This literature reflects my extensive interrogation of the data, which speaks to the many facets of this topic. Interrogating research done in the area of innovative thinking that is packaged in design thinking approach was important because it helped to shape my research. It shaped my research since it presented the available knowledge in this particular topic. This research aims to ultimately add to the field of knowledge that is available on the implementation of innovative thinking packaged in the design thinking approach in a primary school in Trinidad and Tobago. This interrogation of the research lead to the theoretical framework that guided this research. This literature review has been structured into themes. Unpacking innovation, exploring design thinking, integrative curriculum and the Trinidad and Tobago context are the main themes expounded upon in this review of literature. These themes speaks to the perspective of implementing a unit that combines design thinking and PCR as explored in this study.

Unpacking innovation

Innovation has always been ubiquitous but it was (Schumpeter, 1943) who introduced the term innovation in the sphere of business when he argued that organizations innovate in order to renew the value of assets in said organization. ‘Creative Destruction’ is the phase Schumpeter used to describe innovation. (Bareghe, Rowley & Sambrook, 2009) pointed out that even though Schumpeter introduced the term to the world of business; its essence has been in the sphere of business for decades preceding Schumpeter. Schumpeter’s definition established innovation as a “process of industrial mutation...that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one” (p. 83). Apart from coining the term and defining it Schumpeterian innovation perspective was left wide open.

Researchers can shape this ‘creative destruction’ based on their discipline. (Bareghe et al., 2009) attempted to address the malleability of Schumpeterian definition by conducting a study based on a content analysis of previous definitions of innovation in arriving at an integrative one. In an attempt to respond to critics as Adams, Bessant & Phelps (2006) (cited in Bareghe et al., 2009) argued that the term innovation is “notoriously ambiguous and lacks a single definition.” (p. 1324). (Bareghe et al., 2009) eventually defined innovation as:

“Innovation is the multi-stage process whereby organizations transform ideas into new/improved product, service or processes, in order to advance, compete and differentiate themselves successfully in their market place” (p. 1334)

Bareghe et al., (2009) definition is very comprehensive in that it touches on innovation as being a process that transforms for the purpose of improving or differentiating the learning context. However, even with (Bareghe et al., 2009) multi stage attempt at defining innovation is still somewhat discipline bound and as such, further refinement is required. Having grown beyond the discipline of business, innovation is now being akin to thinking processes by educators. The (OECD, 2014) suggest that strategic words in the definition of innovation be swapped for educational terms. Educational organization is transformed by having (1) new or improved products in the form of pedagogy, resources or context (2) The ‘compete and differentiate’ reference would relate to the educational organizations diverse social and environmental context (Bareghe et al., 2009; OECD, 2014). In sum, no one definition encapsulates all the dimensions that are involved in the field of education.

When creativity and fearlessness are coupled with a level of sensitivity and a sound subject context background, innovative thinking becomes unleashed. Innovative thinking has been defined by (Amelink, Watford, Scales, Mohammadi-Aragh & Farquhar-Caddell, 2013) as a

“complex thinking process that is used to transform creative ideas” (p. n.o) Amelink et al. further delineated innovative thinking into a series of higher-order thinking skills. This researcher argues that one core skill imbued in the collection of skills spoken of by (Amelink et al., 2013) is critical thinking. Critical thinking is a skill within which cognitive and affective domains reside. Even though decision making, problem solving and creative thinking are forms of higher-order thinking skills, not every cognitive process or valuable thinking skill is critical thinking (Facione, 1990). Facione was even more precise, “the complex relationships among the forms of higher-order thinking have yet to be examined satisfactorily” (p. 5). Facione profiles a good critical thinker as someone who habitually manifest open and fair-mindedness, probing inquisitiveness, flexible and strong intrapersonal skill. There appears to be a close correlation between Facione’s profile of the good critical thinker and the profile of innovative thinking purported by Amelink et al.

In this study, research has pointed to a number of skills that can be fine-tuned in order to develop innovative thinking. Nonetheless, this current research will narrow the plethora of innovative skills. As such, five core innovative thinking features has been selected to guide this action research in identifying innovative thinking processes. These five core processes have been influenced by the following works (Facione, 1990; Mathematics Advisory Panel, 2009; Partnership for 21st Century Skills, 2009; Amelink et al., 2013; Hasso Plattner Institute of Design at Stanford, 2015). The selected innovative core skills are as follows:

1. Knowledge creation
2. Collaboration
3. Critical thinking
4. Communicative capacity

5. Passion for topic

The first four element of my selected features of innovative thinking can be supported by cited research. Each of the four are skills. As such, they can be developed as any other skill. Whether by authentic or rote methodologies these skills can be developed and the innovative thinking process will can be fine-tuned. However, this research is not an ordinary investigation into innovative thinking in a vacuum. This research is seeking to unearth the humanity in its participants. I did not just want to develop the oxymoron of an innovative drone. A person who will be innovative regardless of the cost to humanity, for example the creators of the atomic bomb.

This study was constructed on the premise that by providing young learners with the ability to instinctively identify how their work will impact people. Therefore, based on these ideologies in the design thinking approach has been selected. Once we can redirect the human capacity to be touched by and motivated by the need to see the point of view of others and to experience the challenges of others as their own. Granted, one can argue that passion for a topic does not have to be a positive one. As a human being, I am hoping that by starting at a young age we can begin to shape the passions of a generation. Thus, the fifth component was included in this study. This researcher stands by the decision to include the fifth component. It is this researcher's understanding from the research data cited that these five components listed have the power to help learners to identify issues, work with others, persist in their quest to find solution, and critically make decisions without the shackles of failure.

Pedagogy of innovative thinking

Pedagogy for innovative thinking also has its roots in the traditions of the Socratic methodology. This methodology focuses on discussion, questioning and experimenting with a

concept of moral education in the context of exploration of ideas (Fahim, 2012). Fahim (2012) expressed the well criticized view that the Socratic method of teaching can be considered the “foundation of western pedagogical tradition” (p. 1123). For that reason, the undeniable relationship between the Socratic methods and its potential to help students clear misconceptions. It allows students to build on their awareness of their ignorance and misconceptions about a topic. Therefore, forcing the students to challenge their own understandings and actively engaging them in the critical thinking process.

Innovation and creativity is often used interchangeably. However, this is not a true reflection of their relationship but most likely it forms the basis of the biggest fallacy regarding innovation. Creativity references the abilities that are most characteristic of creative people (Runco & Jaeger, 2012). Robinson (2006) at a TED Conference defines creativity as a “process of having original ideas that have value more often than disciplinary ways of seeing things”. An examination of creativity from the lens of (Robinson, 2006; Runco & Jaeger, 2012) describes an ability in humans that speaks to two processes- thinking and imagining. When humans act on their imagination they are referred to as creative people. Whereas, innovation involves the human capacity to think about and be creative with something that already exist. When juxtaposed, the definitions of creativity and innovation may be difficult to dispute if one holds the view that there can be creativity without innovation but no innovation without creative. (Stenfor & Tanner, 2006) claimed that “creativity is the essential first step in innovation processes and without, creativity innovations do not take place” (p. 217).

All the definitions of innovation thus far, speaks to the business arena. Based on the quantum of definitions on innovation this researcher contends that a standard definition of innovation be established that is entrenched in the field of education. This education friendly

definition of innovation will guide the investigation in this study. Designing pedagogy to reflect the processes involved in innovation is paramount because such pedagogies are required for innovation to become endemic in a society. Kao, (2007) (as cited in Marburger, 2011) claimed innovation depends on harvesting knowledge from a range of disciplines and it flows from a shift in mind-set that can generate new business models and recognize new opportunities that speaks to shifts in the paradigm as much as breakthrough ideas. According to (Marburger, 2011) this paradigm shift that must accommodate harvesting knowledge requires an educational infrastructure that produces people with a skill set that is broader than science and technology. This skill set should also develop the emotional, social and cognitive dispositions.

A framework was developed by (Partnership for 21st Century Skills, 2009) to help practitioners to integrate skills, knowledge and expertise from the cognitive, social and emotional domains. This framework describes cognitive skills, such as (1) critical thinking, authentic problem solving and system thinking (2) communication at inter and intrapersonal level, such as effective use of oral, verbal and nonverbal communication skills, use of media and technologies, cultural sensitivity, teamwork, self-management and direction (3) collaboration in taking the skilled learnt and working with others (Partnership for 21st Century Skills, 2009). It has been argued that these skills are not new but newly important. In fact philosophers and educators as far as Socrates and Dewey have been advocating for these skills (Silva, 2009). Silva further argued that these skills will equip the future workforce to use multiple data sources to find, analyze information, and make decisions and create or creatively destroy existing ideas.

The Schumpeterian concept of creative destruction is the true core of innovation. The existence of innovations where incremental or radical are not at the core of this research. Rather a pedagogy to impart innovative thinking is a central feature of this research study. Built into a

pedagogy for innovative thinking are the outcomes of 21st century skills. These outcomes include, global awareness, critical problem solvers, flexible, independent learners, effective verbal, nonverbal and so much more. It was found by (Mathematics Advisory Panel, 2009) report findings claimed that (1) academic and non-academic (skills and core content) domains are best learnt together (2) combine the teaching of procedural rule and how to solve problem (3) the use of complex thinking skills are not limited to a specific developmental age. Therefore, armed with these findings a research unit was design for this study. Its delivery of academic content that fuses the skills and content outlined in 21st century skills should produce the rich data in this research study.

Thus far, this literature review has define and redefine innovation for specific education purposes and selected specific components to investigate innovative thinking A statement of attributes has been ascribed to each feature of innovation recorded on table1. Table 1 outlines a compilation of innovative skills components and their attributes.

Table 1

Innovative thinking skills and related attributes

Innovative thinking skills	Attributes of skill
Knowledge processing	Transfer knowledge from one subject or content area to another or new area Ask questions to understand task
Collaboration	Open minded Flexible Intrapersonal and interpersonal skills Assume Responsibility

Critical thinking	Willingness to find solutions to problems Willingness to seek out an alternative solution Willingness to consider an alternative view point Willingness to use various and new materials Willingness to persist at a task Opportunity to engage in scientific enquiry
Communication	Representing ideas in more than one form Ability to share ideas with peers Critique the work of self and others respectfully Work corporately and collaborate with others
Passion for topic	Ability to gather interest from others Willingness to use prototype Willingness to take risk

Source. (Facione, 1990; Mathematics Advisory Panel, 2009; Partnership for 21st Century Skills, 2009; Amelink et al., 2013; Hasso Plattner Institute of Design at Stanford, 2015).

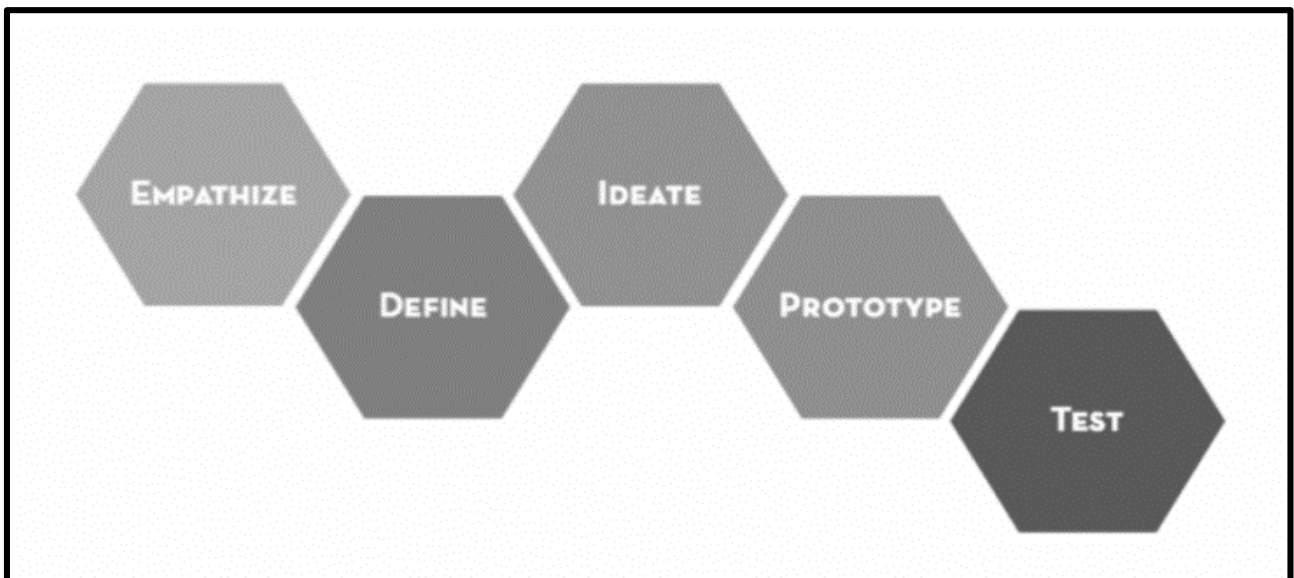
Exploring Design Thinking

Design Thinking Approach allows students to build on their creative confidence as they tackle problems using a designer's mindset (Brown, 2008; Goldman, Carroll & Royalty 2009; Brown and Wyatt, 2010). During the design thinking approach students become gripped in hands-on design challenges that emphasizes empathy, promotes a bias for action, which should nurture ideations, develop metacognitive awareness in support of active problem solving (Goldman et al., 2009). This approach has its roots in the work of designers such as David Kelly and others at the Hasso Plattner Institute of Design at Stanford University (Brown and Wyatt, 2010). For the purpose of this study the five-mode model (an adapted from the original six modes) design thinking model (Stanford University Institute of Design, 2015) has been used as the conceptual framework for this study. The conceptual framework sets the foundation for presenting students with a means by which they can be actively engaged. This engagement involved in prototyping the continuous destruction and rebuilding of objects and ideas considered mundane, fostering the growth and development of dispositions that foster

persistence, curiosity and a love of learning (Kwek, 2011). In the design thinking concept children are presented with challenges. Each encounter students have with a design thinking challenge them to build their creative and leadership confidence. This will be achieved as they think critically and develop dispositions that support innovative solution finding as they undergo the five stages: empathy, define, ideate, prototype and test. (See figure 1)

Figure 1

Design Thinking Approach Framework



Source: Hasso Plattner Institute of Design (2015) <http://dschool.stanford.edu/dgift/>

During the design thinking challenges students can become design thinkers. “As students become design thinkers, they emerge with significant changes in their approach to problem solving and to new challenges” (Goldman et al., 2012). Becoming a design thinker transforms a student and create what Goldman et al. called “mindshifts”, which essentially occurs when learners “epistemological viewpoint and instincts are strengthened and made observable through changes in learner’s orientations and actions as a design thinker” (p.15). To understand how these changes affect the learner each element of the conceptual framework will be explored.

Firstly the component of empathy. According to (Hasso Plattner Institute of Design at Stanford, 2015) empathy is the key to understanding people within the context of their quagmire and it allows the students to internalize the point of view of the persons within the quagmire. As the students begin to understand the processes of others, their physical and emotional needs and how they think about and value the world. It is hoped that the unlocking of human-centered design process begins in students. This process involves the students becoming immersed in issues relating to the challenge they are observing, interviewing, researching, listening, experiencing and interacting with persons involved in the problem (Carroll et al., 2010).

After students have been immersed in the bowels of the design challenge, understanding the issues involved, they begin to develop clarity and focus to the design challenge or issue. This signals the second stage in the design thinking model-define. The ultimate goal of this second stage is to develop a point of view that can guide and provide a meaningful and actionable statement that makes sense of the design challenge. This is the point where the design thinker really consciously begins to address the issues. They begin to capture the hearts and minds of their audience, inspire the team and fuel the brainstorming process by suggesting a way forward (Stanford University Institute of Design, 2015).

At the ideate stage quantity and diversity is encouraged (Carroll, et al. 2010; Stanford University Institute of Design, 2015). Students must be allowed to think up all possible and impossible solutions. Each idea must be respected and recorded. The ethos is critical as students must be able to feel that no idea is too small or foolish. Carroll et al. contended that the classroom ethos must be one that challenges the students to become “silly, savvy, risk takers, wishful... and dream the impossible” (p. 40). There is a level of collaboration and collegiality that opens the students up to the unexpected.

Prototyping takes ideas from the imaginary to reality. Whether on paper or any other physical form. It can be notes, drawings, space, an object, role playing or even a story board, Carroll et al. (2010) suggest that a diverse set of materials be provided to designers to make prototypes. Prototypes are learning devices in their own right. They help the designers learn more about the effectiveness of their ideas. Prototype development leads naturally to the testing stage. This is the point where the iterative feature of the approach is quite evident. Feedback obtain from users during the testing of the prototype highlights what works, what does not work and lead the way to iterate. At this point a prototype can be enhanced, redeveloped or jettisoned all together. Students build resilience as they persist in their quest for a solution. An examination of the conceptual framework of the design thinking approach leans itself to exploring the creative potential and humanity within students.

There is a theoretical support for design thinking as a pedagogical approach comes from social constructionist view, constructionism and pragmatism (Carroll et al.2010; Dalsgaard, 2014). Design thinking approach is steeped in the Vygotskian view of socio-cognitive learning or social constructivism. Vygotsky contented that knowledge is constructed within the midst of interactions with others and is shaped by the valued skills and abilities of a particular culture (Darling-Hammond, Orcutt & Martin, n.d.). Vygotskian arguments (1) language is a tool that can guide the learning process (2) internalized speech becomes part of the learner's strategies for problem solving, (Darling-Hammond et al.). According to Vygotsky (1978) the use of language helps children be strategic, rather than impulsive, when encountering complex problems, this helps them to self-regulate their own thinking and behavior. As student navigate through the stages of design thinking approach conceptual framework they are actively engross in rational discussions, develop deep understandings of a domain congruently building cognitive and valued

emotional and social competences, namely empathy with users and collaborative skill with peers and others (Carroll et al, 2010).

In this study, Vygotskian perspectives will guided this pedagogical strategy. Almost the entire Unit has been developed around social interaction, social sharing and discussion as a tool to expand taught and learning. In addition, discussion will serve to clarifying new concepts or misconceptions. Vygotsky saw language as a tool of constructing knowledge and understanding of the world of the learner. This knowledge can be great facilitated if the learner is peered a more knowledgeable other to guide the learner from the unknown to the know (Clapper, 2015). In a study of the literature of cooperative-based learning and Vygotsky's zone of proximal development done by Clapper (2015) found that in the learning of new materials or skills, "learners sometimes need to be assisted with moving through the disequilibrium process" (p.). This disequilibrium can occur as learners are exposed to new information that may be in conflict with what they already know. During the design challenge learners will enter with a bank of life experiences and they will be exposed to possible new modes of thinking. They will also be required to consider alternate paradigms. Therefore, my role of teacher facilitator and co-learner is critical to help students navigate their way through the design challenge.

Constructionism is a significant addendum to the epistemological philosophy of constructivism (Royalty, 2014). Constructionism as purported by Papert (1993) (cited in Resnick, 1996) makes some central assertions about the Constructionism. Firstly, learning is an active process by which learners actively construct knowledge from their experiences (a constructivist connotation) and learners construct new knowledge with particular effectiveness when they are engrossed in constructing artifacts in the public domain (Papert & Harel, 1991; Resnick, 1996; Thoring & Muller, 2011 & Abrahamson, In press). When we align

constructionism and design thinking approach linkages become highlighted. One such linkage rest in the belief that learners must be engaged in constructing personally-meaningful experiences, reflecting on problems and solutions, which involves an iterative dialectical process of building artifact; all of which is initially packaged as a challenge to solve (Abrahamson, In press). They both also speak to a goal-oriented interaction with materials and reflection that functions as a platform to motivate learners to search for a solution to problems (Carroll et al, 2010 & Abrahamson, In press]. One primary difference is the depth at which design thinking immerse the learner into the human component of a challenge in their development of empathy, people then becomes the source of inspiration (Carroll et al., 2010).

In this study, a constructionist dynamic will be used. As learners will be asked to produce prototypes of their ideas, in essence they will be bring their imagination into the physical world. The development of a “prototype mind-set” is critical to the implementation of any design thinking approach (Carroll, .n.d.). Learners will be actively engaged in building to think as they create, test and refine solutions to deepen their understanding of the human challenges (Stanford University Institute of Design, 2015). Researchers from the design thinking approach lab suggest that prototypes can be anything that takes a physical form, post-it notes, role-playing, space, an object, or an interface (Stanford University Institute of Design, 2015). In this study, learners will be asked to produce prototypes of their desire.

Pragmatism is a branch of educational philosophy that is rooted in the work of three early thinkers Charles Peirce, William James, and John Dewey; Dewey however, can be credited for offering the largest contribution towards the popularization of pragmatism (Chennault, 2013). Pragmatism informs us that “thinking begins when experience is interrupted and a problematic situation recognized” however, under the influence of Dewey traditional pragmatism become

critical pragmatism (Feinberg, 2015). Feinberg further explained that critical pragmatism highlight situations in which concerned Dewey. Dewey's concern stems from the focus of traditional pragmatism that should address the problems of people and the problems of philosophy. Both design thinking and this Deweyan focus of pragmatism converges at these concepts the "theory-practice relation, emergence and interaction, situation, inquiry, transformation, technology and experience" (Dalsgaard, 2014 p. 146). These concepts according to Dalsgaard are not just the constitution of the core of the Deweyan position on pragmatism but they can lissomely interrelate and form a cohesive conceptual framework. This conceptual framework resonate with the key themes of interaction involved in design thinking.

Clearly, under the Deweyan influence pragmatism, according to (Dalsgaard, 2014) presents a "highly situated human activity in which our reciprocal capabilities of action and reflection form the basis for sense marking" (p. 146). Both design thinking and Dewey argued for a human centered focus and interactions that facilitated and examine the properties of self, others, surroundings, artifacts and social constructs (Carroll et al, 2010; Delsgaards, 2014). Apart from Dewey input to pragmatism, his contributions has dominated the inputs to progressivism. In the sphere of education pragmatism is clearly a philosophy but progressivism denotes a loose collection of educational practices that has pragmatic underpinnings but start in opposition to the ethical movement, (Chennault, 2013) Progressivism has been outlined by Chennault as (1) child-centered rather than a teacher central and (2) emphasizes that the personal experiences of learners should be allowed to serve as the basis of their educational experiences (3) places an explicit emphasis on learning through solving real-life problems. Progressivism then touches the heart of the design thinking approach as it can be considered the birthplace of project approach.

In fact, the unit that was constructed for this study has been enacted and assessed in relation to the conventions of project or performance based approach. In keep with the progressive prospective each child's background was appreciated and viewed as a social and emotional creature, as opposed to focusing strictly on the academic, (Eisner, 2002). The progressive nature of design thinking allows learners to exercise and develop their intelligence to reshape their environment. This stance is further supported by (Eisner, 2002; Chennault, 2013) who articulated that the creation of task called education situation by progressivism and design challenges by the design thinking approach through which a child becomes increasingly able to do complex and demanding problems.

Understanding the children

Children selected in this study all hail from the infant year one and year two classes. The children can be characterized developmentally as middle children. Middle children are described as children between the ages of six to twelve years (Newman and Newman, 2003). They are faced with specific developmental tasks and as they "become focused on friendships formation, concrete mental operations, skills learning, self-evaluation and team play", according to Newman and Newman (2003, p. 255). During that stage Newman and Newman, (2003) argue that unlike the previous stage of development early-school-age children, middle childhood is characterized by a more purposeful industrious behavior" (p. 255). Further, Newman and Newman claims that play transforms into the capacity to engage in more complete forms of play and the desire to take new risk Newman and Newman, 2003).

Middle children are at crossroads. They are at the ending stage of early childhood and on the crust of early adolescences. Previously, the middle childhood period of development was not considered significant by Newman and Newman, (2003). It was the research of Erikson and

Piaget that awaken this period of development as a significant contributor to personality and learning, according to Newman and Newman, (2003). Pedagogy for children during this period of development must span research that speaks to methodologies that are prevalent in both early childhood care and education (ECCE) and the elementary period directly after ECCE period.

A study conducted by Lowrie (2002) outlines the type of problems children age 6 create in a problem- posing context. With support the children's capacity to produce progressively sophisticated problem. The study found that under the guidance of a teacher children's problem posing actions can be nurtured. Even though the study used young children Lowrie uncovered that "they were able to identify important components of the problem and suggest which mathematical operation would be required to solve problems." (p. 361). The work of Lowrie gives credence to providing children with an opportunity to identify, define and pose solutions to a given problem. The use of problem solving is a critical component of innovative thinking and using the design thinking approach.

Further the work of Riley and Reedy (2005) investigated developing young children's thinking through writing arguments. This investigation involved the use of two case studies. One study was done in a year 1 class of 25 children ages 5 – 6 years and the other study with a class of 27 year 2 children ages 6-7 years. Both groups were engaged with contentious, real life issues and it was found that if it offered structured support the children would be able to produce written text in an argumentative genre and develop their thinking skills as well. Riley and Reedy (2005) found that the children were able to intellectually "grasp the complexity of an issue and can develop an argument following the conventions of discourse in a sophisticated way" (p. 51).

Clearly both Lowrie (2002) and Riley and Reedy (2005) supports the foundations for this action research. Firstly, both studies involved used similar student participants. Also, they found

that young children had the intellectual capacity to manage problem challenges, identify their components, and sophisticatedly discuss a problem in the vein of solving problems.

Understanding PCR

In Trinidad and Tobago, a new curriculum has been conceptualized. This new curriculum seeks to equip students at the primary level with “knowledge, skills, and dispositions to optimize their development and ultimately to constitute a caring, respectful and socially conscious citizenry” (Trinidad and Tobago Ministry of Education, 2013). To proclaim this mandate an integrated thematic curriculum has been developed as a replacement of the former subject centered curriculum. Shoemaker (1989) as cited in (Bocos & Chris, 2013) defines integrated curriculum as an “education organized in such a way that it intersects the main topic areas across several disciplines, generating and interactive vision of the real world” (p. 24).

PCR however is not simply an integrated curriculum but rather it has a thematic element to its construction. Therefore, as proposed by Shoemaker (1989) as cited in (Bocos & Chris, 2013) PCR is an organized package of core content from nine subject areas. PCR also has a series of pedagogical initiatives to help further teacher understanding, implementation and reflect. Thematic instruction could provide an effective way to incorporate concrete learning, real world experiences and core content knowledge from different subject domains (Min et al., 2012).

Implementing an integrative curriculum as PCR does pose some level of challenges to teachers. Noel (2014) in a qualitative study examined teachers’ concern pertaining to the implementation of the new integrative curriculum. Noel found that teachers require more information about integrative curriculum and training session implementation. Noel’s findings then speak to concerns that could be manifestations of challenges faced by teachers in Trinidad

and Tobago regarding the implementation of the said curriculum that this study combined with design thinking.

Within PCR a number of useful techniques that has the power to engender a “yearning for learning” as requested by Vision 2020. As such, it facilitates a smooth, unremitting transition from the ECCE curriculum to infant and other levels within the primary system. Along the way preparing the child for the National Standards examination at standards one and three. All of which culminates with the high stakes Continuous Assessment Component and then eventually Secondary Examination Assessment. PCR then appears to function as the catalyst by which educational transformation cuts across the primary system. It facilitated the transition from teacher and subject centered curriculum to a student centered thematic compilation of learning initiatives.

Chapter 3: Research Design

Introduction

A research design acts as the road map in any research. Johnson and Christensen (2014) have argued that “design is the plan or strategy you will use to investigate your research question (s)” (p. 116). Within the design the researcher charts the course of the study because it outlines the assumptions about the phenomenon being explored in the study. Research design holds the researcher’s assumptions regarding one’s belief about the nature and definition of science, data collection, the analysis and interpretations. It is along these lines that this chapter has been organized.

Action research

According to Check and Schutt (2012), John Collier and Kurt Lewin in the 1940s were both interested in different ways of intersecting social justice, research methods and organizational change and how it can be made. However, it was Kurt Lewin who coined the term action research and he stressed that theory and practice should be connected and lead to action that births social improvements, (Johnson and Christensen, 2014). Action research entrenches the researcher in the evidence-based enactment of specific phenomenon. Mertler (2014) argued that it allows teachers to study their own classrooms in order to better understand and improve the quality and effectiveness of the teaching and learning processes. This speaks directly to the definition of action research by Peter (2004) “Action research, in particular, is depicted as a means of engaging practitioners in rigorous cycles of planning, observation, action and reflection, which can lead to change in understandings and practice” (p. 536).

Action research is focused on solving a practitioner's problems by generating local knowledge, which will often result in a change in practice (Johnson and Christensen, 2014).

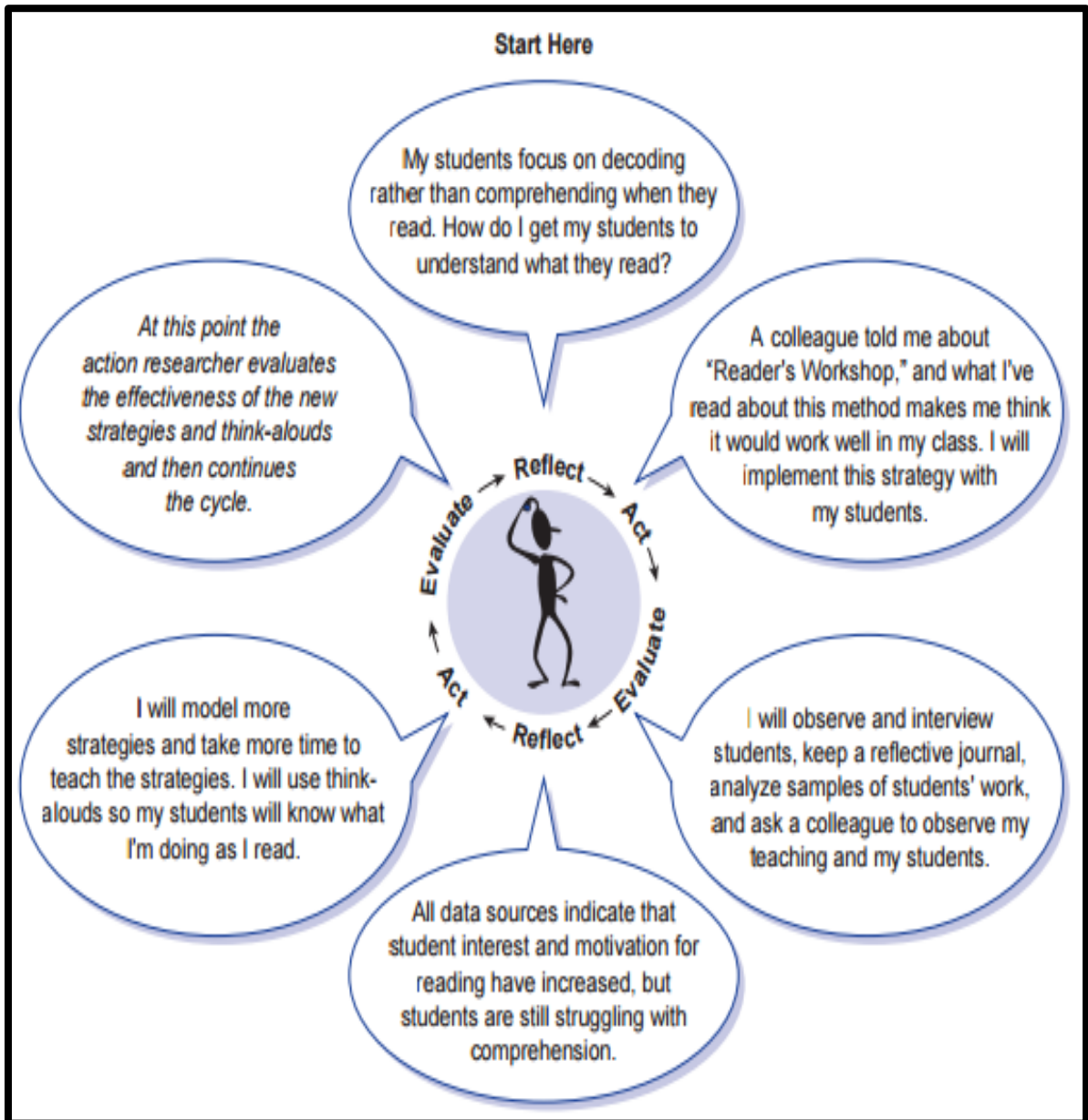
Successful action research is not a requisite to an understanding of the belief of the quantitative and qualitative camps. Its explicit focus on action and promoting change from within the school community makes this possible. Mertler (2014) argues that action research “typifies grassroots efforts to find answers to important questions...it is entirely practical-and not necessarily philosophical-in its application” (p. 9). This view was supported by McNiff (2002) (as cited in Hendricks, 2009) who explained that the epistemology of action research “is something that action researchers do-their living practice-rather than fixed, static, or absolute entity” (p. 3).

There are many models of action research. Yet all seem to speak to the practicality Lewin sought to achieve. Action research describes a systematic and self-critical inquiry; which implies that is structured and utilizes an action process that does not seem to have an end Mertler (2014). The various models of action research hold common characteristics namely begin with a central problem or topic, collection and analyzing data, collimating with some sort of action, which invariably spirals the researcher back into the process repeatedly (Mills, 2007 as cited in Hendricks, 2009). In the conduct of this classroom action research the Hendricks model of the Action research process was used. Figure 2 depict the Hendrick Action Research Process.

I choose action research because it allows me to function as both teacher and researcher. Therefore, I got an opportunity to tests the effectiveness of an approach that I hope can bring about an improvement in my current programme. The series of steps in which the Hendricks action research model allows the researcher to undergo was very alluring to me as a first time action researcher. This model starts with reflection, which influenced the act and ending with an evaluation of the action. Figure 2 outlines two cycles of the Hendricks Model that I had personally undergone into the conduct of this study.

Figure 2

Hendricks Action Research Model



Source: Adapted from *Improving Schools Through Action Research: A comprehensive guide for educators* (p. 9), by Cher Hendricks, 2006, Boston: Allyn & Bacon

Application of Hendricks action research model

Reflection is the start of the Hendricks action research process. When I began thinking of the issues in the field of education that interest me, my thoughts gravitated towards the inappropriate behaviours my students displayed along with their academic challenges. My students were displaying a level of indifference that seemed surreal. Some students were showing no regard for the feelings and property of others. They would use harsh words, refuse to share anything (snacks, resources, and the like) tell lies on each other, hit peers and deface furniture. The academic challenges were not that severe because this is the level at the primary school where the literacy foundation are established. The challenge in the academic area can be viewed from essentially a teacher's perspective. In that I am continually looking for new literacy experiences for my students. They are at different points on the writing continuum and this is where the challenge rest.

At the workshops over a year ago some teachers were introduced to PCR. Teachers are now being asked to enact this new curriculum. In unofficial discussions with colleagues in my profession I realized that most of them were not implementing PCR. In fact, some claimed that they have not changed their pedagogical practice or believes. As I examined PCR in relation to the global economic and educational conditions I wondered if I am preparing my students for living and working in the 21st century. Was I preparing my student to think divergently, collaborate with different people, exercise their creative abilities and communicate with others freely?

The second movement in the cycle is Act. During this phase my research led me to the design thinking approach. After an intensive investigation into the history, effectiveness and application of this approach I developed a unit that maps the design thinking approach to the

content outlined in the PCR curriculum guides. After grounding the unit in theory and ensuring that it was theoretically sound it was implemented. During the implementation process various data was collected for analysis. A critical part of the data that was collected was my teacher's reflections. This required soul searching reflection as a teacher researcher. I felt as if I had a split personality because I had to mental exist myself and look inward. Each reflection felt like having an outer body experience. These reflections influenced the proceeding activity/lesson plan.

The final stage evaluation. Each activity was evaluated. My implementation was evaluated via my reflective journal and the data collected from students. Examining my student work felt good and was very 'at home' to me. This was my comfort zone. Coming out of each evaluation data was used to inform the next click in the cycle. I noticed that the analysis of reflection inform the next reflection at the beginning of the next stage in the cycle.

The Researcher

In action research, the role of the research is to investigate their practice and professional self. This occurs as they become engaged in vigorous reflection, planning, collecting of data for the purpose of solving a practical problem in their authentic setting (Hendricks, 2009; Check and Schutt, 2012; Mertler, 2014). With the understanding of this vital role I approach this study with the knowledge of the awesome responsibility for rigor in this study. According to Mertler (2014) rigor refers to "the quality, validity, accuracy and credibility of action research and its findings" (p. 27). The value of this study would rest essentially on my professional integrity and researching skill.

November 2015 will mark my nineteenth year in the teaching profession. I am a Primary School teacher holding the position of Acting Senior Teacher 1. This is a position I have held for the past three years. Out of the nineteen most of my teaching career has been working with

children 3 to 4 years old at Early Childhood Care and Education (ECCE) and student in the infant department of the primary school. As such most of my experiences has been with the early childhood level at both the Primary and (ECCE) Departments. After I earned my Bachelor Degree in Early Childhood Care and Education I shifted for three years from the Primary Education Department to the ECCE Department within the Ministry of Education. My hiatus to ECCE lasted three years as an Administrator/Teacher ECCE. As the job title suggest I was both manager and teacher.

Currently, I am assigned to the infant department where I teach both first and second year classes. While at ECCE I was engaged in implementing various researched based changes, such as implementing a new integrated thematic curriculum and Reggio Emila Projects. Both curriculums transformed the pedagogical practices within the ECCE sector in Trinidad and Tobago. The sector moved from teacher centered to child centered practices. At the primary level I have integrated both the infant 1 and infant 2 curriculum. I am using projects and themes in the delivery of content in a mixed ability and level setting. Therefore, integrating curriculum is not in any way new to me. As such developing a combined unit that incorporating different curriculum seem less daunting in the inception.

After reflecting on the phenomena in which I wanted to investigate I felt that action research will adequately do the task justice. In that it will allow me as a teacher/researcher to improve my practice. Also, I will be able to identify any disparities between what research studies say about cultivating innovative thinking skills and the reality of my classroom context. Similarly, the malleability of both design thinking approach has already been authenticated. Additionally, my experience in implementing an integrated thematic curriculum should be an asset.

In sum, by conducting an action research study in my classroom I will be essentially personally involved in the process from construction to assessment. Thus, I will have an opportunity to experience the effectiveness or lack thereof try to cultivate innovative skills using the design thinking approach (developed in the western world) integrated with the tenant of PCR in my Caribbean classroom. In so doing conducting this action research can fill the gap between theory and practice.

The research setting

The school in which this study is being conducted is a small urban one in the Port of Spain and Environs District. The school is nicely nestled on the borderline of two very active communities. After school the compound serves as a gathering point for community football, steelpan and a church. The community is essentially a working class community. The school has been in existence since 1938. Many of the adults in the community attended the school. Even though the school is in an urban area it has a rural feel. Less than forty percent of the school's population comes from the community. Most members of the community choose to send their children to schools outside of the community. No formal study was done to explain the low population. However, informal feedback from parents who withdrawn their children and those who choose never to even apply to the school blamed the physical appearance, lack of teachers, and perceived weak academic performance. The persons who come from outside of the community has indicated that they were not accepted at the other schools in the district.

At the district level the principal was unofficially informed that the school ranked third in the district based on the Standardized National Test results. There are five trained teachers and one acting principal at the school. Currently the population of the school consist of eighty students even though the building can accommodate three hundred and fifty students. There is a

teacher shortage at the school as a result the Principal is also a class teacher and the Infant department only has one teacher even though it should have two. As a result of the staff shortage teaching time can at times be constrained because teachers may be faced with managing more than one class on any given day. There are very limited technological resources at the school namely, internet, fax, phone, photocopying machine and so on. There is a television, stereo system, projector and video recorder but these resources can be accessed only for Continuous Assessment Component (CAC) purposes. As, such teachers who are not CAC teachers have to source personal resources. There is no opportunity for children in the infant department to interface with technology in the classroom.

The sample

Sampling refers to the process of drawing a group from the population, it involves studying the characteristics of a subset (the sample) selected from the larger group (the population), Check and Schutt (2012). In this study the larger population consisted of a class of thirty-six children in the infant department of a school. More specifically, the infant department constitutes the largest block of students in the school. Currently, there are fourteen children in Infant 1 -five girls and eight boys. While in the Infant 2 class there are twenty-two students- fourteen boys and eight girls. There is a wide disparity in the ages of student in the infant department. Their ages range from six to sixteen years. The mode age of students in the infant department is seven years old. However, they come together for some subjects, as Social Studies, Science, Religious Knowledge, Visual and the Performing Arts. In the conduct of this study thirteen students of the thirty-six students were used in the study.

Sampling strategy

Purposive sampling specifies characteristics of a population of interest and then tries to locate individuals who have those characteristics (Johnson & Christensen, 2014). I wanted to pick thirteen students who represented the population of the infant department. Hendricks (2009) advised that action researchers to consider “rather than choose participants randomly or systematically, they work with individuals around whom their research revolve.” (p. 3)

Purpose for selection

When I looked at the entire class I realized that it would be impossible and impractical to analyze all thirty-six students from the class. So after examining my population of students I selected thirteen students from the class, nine from Infant 2 and four from Infant 1. It is my belief that these students will be a good representation of the class.

I chose these students because they will be able to provide rich samples of work and provide diverse descriptions of ideas that emerged during the sessions. This is important to me because I wanted to understand how a combination of design thinking approach and PCR would work.

All of the students were given pseudo identities to protect their identities. Their parents agreed with the researcher that the children’s identity show be protected. These participants were selected because they are a good representation range of students based on gender, age and academic performance. Table 1 depicts the pseudo names of participants their name, gender, age, class, and purpose for selection of the participants

Table 2

Listing of participants and the purpose of selection

Pseudo Name	Gender	Age	Class	Purpose for selection
Ace	M	6	All Infant 1 (First year) students	Ace was selected because he is a very sociable child. He has a high absenteeism rate and as such he has some gaps which has been attributed to his low academic performance.
Carla	F	6		Carla is academic performance has been average. She seems very sociable as she has made friends with students from both classes.
Raymond	M	6		He is an out spoken child. He does not seem to have been very successful in his attempt to make friends. His academic performance has been excellent during two terms in the class.
Jenny	F	7		She is a quite child with very few friends in her class. She has an excellent academic performance but weak social skills.
Harry	M	8	All Infant 2 (Second year) students	Harry has had a weak academic performance in the area of language and literacy areas but he has excelled in the area mathematics. Harry gets into lots of fights but he interacts fairly well with the other children.
Mark	M	8		Mark has an excellent academic performance record. He is sociable and outspoken. He is a popular student in the class.
George	M	7		George has an excellent academic performance. He is very sociable and general tries to keep the peace in the class.
Bob	M	7		Bobs academic performance has recently moved from below to average based on the results of his last end of term performance. He does not have many friend and is frequently involved in fights.
Nigel	M	7		Nigel has been a friend to all children in the class but he is not outspoken in anyway. His academic performance has been average

Sherry	F	7	Sherry has an excellent educational performance. She is very sociable and outspoken.
Connie	F	8	Connie was transferred into the school in February 2014 and placed in a standard one class. At the end of the 2013-2014 academic year she was placed in the infant 2 class for the 2014-2015 academic year. She has a weak academic performance and is frequently involved in fights. She has begun to display signs that she is losing interest in academic work
Rayann	F	16	This child has been diagnosed has having a mild form of mental retardation. She has moved throughout the school. She stays in the infant department because she is very comfortable with me as her teacher. She appears to have the cognitive capacity of a 6 year old. She manages will with academic content targeted for an infant one student. However, socially she is aware that she is older and conducts herself with the maturity of a teenager. She was selected because I wanted to see how she would function under a design challenge.
Sheldon	M	9	Sheldon asked to return to infants because he could not cope with the level of work being done at Standard one level. The only reason he was promoted was because of his age. At the standard one class he had stopped working altogether and began staying at home or crying to stay home. His mother died a year ago and he is still adjusting. I felt that Sheldon needed a purpose and direction. In my opinion the design thinking approach would be a good motivator for him.

Data collection procedures

Data collection in action research serves a greater purpose than just gathering information. Firstly, Mertler (2014) explains that data collecting falls in the acting stage of action research. The selection of data then manifest itself as a compilation of tools and strategies that emerge from the nature of the research questions, rather than the theoretical orientations (Efron and Ravid, 2013). Multiple sources of data collected strategies is vital in action research.

Hendricks (2009) argued “multiple data collection strategies must be employed to establish the credibility of research finding.” (p. 71)

Qualitative research methods were used in the conduct of this study for the purpose of informing my lived practice. The research questions that guided this study are as follows:

1. What challenges would be derived from implementing a unit that combines the design thinking approach with PCR.
2. How would design thinking impact student innovative thinking?

For the purpose of this action research study data will be collected in relation to answering the two stated research questions. Each research question has its own data collect path. Data for research question 1 will be sourced from the researcher’s journal. The researcher’s journal according to Johnson (2004) records the “thoughts and observation related to all the parts of the research” (p. 63). This journal has documented my challenges and various experiences from the construction of the teaching unit to its implementation in the study. Research Journals speak to a reflexive approach to the qualitative research process allowing the researcher to evaluate the experiences to give a measure of perspective, (Ortlipp, 2008; Ellis, 2001; lamb, 2013). Including the researcher’s journal into the qualitative paradigm has become widely accepted; however, there has been limited literature on the use of reflective journal as an integral part of the research process (Ortlipp, 2008).

In attempting to answer research question 2 data will be collated from artifacts and observational data. In this study artifacts refers to the various types of student generated work (Hendricks, 2009). As such student generated artifacts came from students execution of given task. Samples of student written work, performances and prototypes. The observational data emerged in this study from teacher observational records and narratives. In my dual role of

teacher/researcher during the collection of observational data I function as a participant-observer. Observational data has been described as the most important source of information in an action research by Hendricks (2009) because it help to “determine why an intervention was successful or unsuccessful and how the context of the setting impacted the study” (p. 82). The observational data in this study took the form of shorten field notes, short interviews between teacher and student. Also, checklist will be used to record observations of group work.

These data were collected during the implementation of a specifically designed unit for this study. The unit combined the design thinking approach and PCR. This unit has been outline in Chapter 4. This unit was constructed with the tenets of design thinking approach and the content of PCR. The unit was implemented over a period of five days. I designed the unit to require six sessions even though design thinking approach framework has five elements. I felt that I needed to ensure that they understood the problem of poverty. Each objective in the activity/lesson plans attempted to meet the requirements of design thinking and the content of PCR. I used various pedagogical and formative assessment techniques to stimulate their thinking and imagination. Some of these techniques are group and peer work, discussion, performing arts, student drawings and writings. I wanted to ensure some level of accuracy in the recording of the data so some sessions were audio and video recorded. By having these two sources of data recording information can be saved for authenticity.

Data Analysis

Data from both research questions were collected from qualitative sources and as such the data analysis will also reflect the traditions of this research paradigm. The qualitative data will be transcribed in order for me to gain an intimate familiarity with the data. The researcher’s journal will be read and reread looking for details that generation initial code and which can be

reviewed for thematic analysis. According to Braun and Clarke (2006) “thematic analysis is a method for identifying, analyzing, and recording patterns (themes) within data.” (p. 7). A theoretical or deductive analytical approach will be taken. This approach is an explicitly analyst-driven, therefore, it tends to forgo the more rich description of the overall data for a more detailed analysis of some aspect of the data Braun and Clarke (2006). As advised by Braun and Clarke the data will then be coded for specific research questions. Table 3 outlines the steps that will be taken in analyzing the data

Table 3

Process use to analyze qualitative data

Step	Process	Description
1	Becoming familiar with the data	Transcribing data- reading and rereading the data, noting down ideas
2	Generate initial codes	Coding interesting features of the data in a systematic fashion across the entire data set
3	Searching for themes	Collating codes into potential themes
4	Reviewing themes	Checking in the themes work in relation to the coded extract
5	Define and name themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells
6	Producing the report	Selection of compelling extract, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis

Source: Braun and Clarke (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3 (2). pp. 77-101

In the analysis of the qualitative data the processes identified in table 3 will be followed. Step 1 would involve the multiple readings of my reflections and further reflective consideration of my reflections recorded in my journal. It is my goal to fully understand, internalize and become quite familiar with the data recorded in my journal. Step 2 involves the systematic

jotting of initial codes over interesting featured in the data. As such, this will bleed into step 3 which involves gathering all the codes grouping them and finding related elements for grouping them into themes. This will lead directly into step 4- reviewing themes. Once the themes have been identified I will review them to ensuring that they truly speak to their respective codes and then the entire data set. Step 5 will involve a continuous analysis of each theme in order to refine the specifics of each theme. The final step will involve an alignment of the literature to the themes uncovered during the investigation. This will ensure that the entire process relates back to the research question under investigation. All of which will culminate with the writing of a scholarly report.

The data from research question 2 will be derived from observational checklist and samples of students work. The data gathered from observational data will be tabularized and placed on tables. The tables will then be interpreted. Samples of student's work will be examined in order to find indicators of innovative thinking. These indicators have been derived from the selected list of innovative skills identified by the researcher in the literature review.

Ethical considerations

Researchers must adhere to ethical traditions that have been universally recognized as vanguards of any credible researcher and their research. Merriam (2012) call attention to the importance of validity and reliability of research; as it directly impact the lives of individuals. In a checklist of ethical issues as put forward by Patton (2002) was internalized by this researcher. Patton's entire checklist guided my actions and decisions but the issues of confidentiality, informed consent, explaining the purpose of the research were at the forefront in this decision making.

In my pursuit to ensure that the highest ethical standards were maintained for this action research I obtained informed consent from my principal, the parents / guardians of the participants and the participants themselves. I spoke directly to all parties involved. I explained in great detail the purpose of the study, the role of the school and participants. Each party was given a letter outlining the details of the study (See Appendix A and B). I made myself available to answer all their questions and concerns. On the participant consent form parents and guardians were informed of they have right to withdraw their child from the study at any time. They were also informed that they can have access to the data before it is published.

In my efforts to maintain good ethical standards confidentiality assurances were made to parties and the following actions taken. The identity of the school and its location has been withheld. Additionally, all of the participants have been given pseudonyms.

Limitations of the study

Limitations to a study are those factors that are generally outside of the remit of the researcher but yet may place restriction on the conclusion and use of the study (Best and Kahn 2006). The limitations of this study were as follows:

- This study is limited to combining the design thinking approach with the Trinidad and Tobago new Primary Curriculum into a teaching unit.
- The attendance patterns of the children. The researcher has no control on the daily attendance of the participants of the study.
- The curbing of the researchers bias- I am the class teacher and a member of staff at the said school. This can create a possible bias as I am very close to the research setting and

participants. Notwithstanding, I have made every effort to ignore my personal sentiments and managed the research setting in a professional manner.

Delimitations of this study

A study's delimitation reflects the boundaries that demarcate the study, Best and Kahn (2006). The following are the delimitations of this study:

- The study is limited to one department in one school in an education district in Trinidad.
- The participants are limited to thirteen students from a class in a school.

Chapter 4: Unit Rationale

PCR has changed the paradigm in the primary education system from one of standalone subjects to an integrative approach. This change has provided the catalyst for the introduction of Big Ideas and other pedagogical initiatives. Flach (2011) proposed that “Big Ideas are personally worded statements derived from a deep understanding of the concepts under investigation” (p. 59). Big Ideas speak to universal generalizations and applications. Apart from Big Ideas other pedagogical strategies were used throughout the unit. These new pedagogical strategies require a change in our conceptualization of curriculum planning and implementation.

The curriculum changes proposed by PCR should help learners to make sense of the content that was delivered in standalone subjects. These standalone topics may have seemed to be devoid from the reality of pupils at times. This unit embraces learners as co-creators and collaborative problem-solvers driven by empathic considerations and a bias for action. (Brown, 2009) proposed that designs have the greatest impact when they are placed in the hands of everyone. This unit proposes to do just that- it seeks to place designer’s tools namely divergent thinking, creativity, empathetic contemplation and a bias for action in the hands of children in a Trinidad and Tobago classroom.

The design thinking approach teaches real world skills alongside the traditionally valued reading, writing and arithmetic, whilst preparing learners for further education and professional life, yet keeping learners connected to their community (IDEO 2009). When the Design Thinking approach is integrated with academic content it functions as a powerful tool for both teachers and learners as it supports a wide range of interdisciplinary academic content, Kewk (2011). Therefore, teachers implementing this unit would not have to be concerned about

meeting the mandates of curriculum content coverage as outlined in the Curriculum Planning and Development Division (2013).

Once one considers that design thinking approach can be used to develop a curricular framework which can both meet the traditional academic standards and the valuable skills of design thinkers, namely, creativity, adaptability, empathy and synthesis; its implementation should be considered a necessity (IDEO 2009). This approach will not only respond to the governmental mandates outlined in future statements and plans. Also, having accoutred young citizens of Trinidad and Tobago to be globally relevant and equipped with innovative skills. These skills could serve to keep this country globally competitive.

In sum, integrating PCR curriculum content with the elements of the Design Thinking model was a strategic decision made by the researcher. Clearly design thinking has the potential to meet the essential pedagogical requirements of PCR. Nonetheless, additional desiderata, such as, teacher accountability and responsibility to meet the administrative mandates were considered in the development of this unit.

The various forms of assessment that support this unit are critical in determining the effectiveness of integrating design thinking approach with PCR. Assessing the impact of this curriculum framework will speak directly to determining the effectiveness of the pedagogical practices employed in the delivery of this unit. Also, the unit's ability to facilitate innovative thinking processes of young learners. Assessment is a fundamental component of teaching. Assessment for learning manifests as teachers provide learners with descriptive feedback and coaching for improvement (Ontario Ministry of Education, 2010). This unit uses formative assessment during the instructional processes as a means for teaching and learning. (Boyles & Charles, 2014) claimed that formative assessment is synonymous with assessment for learning

and function as an intrinsic and essential part of teaching and learning. (Boyles and Charles, 2014) defines formative assessment as an “intrinsic and essential part of teaching and learning and provides the specific information that enables teachers to support learning progress matched to the individual and complex needs of pupils” (p. 29)

Supported by the work of (Boyles and Charles, 2014) the teacher implementing this unit will be able to elicit evidence regarding where students are in their learning and understand how to support their learning needs by pairing it with instructional strategies. The planned formative assessments that are built into this unit will be used to gather information (evidence) to support students learning while they are involved in the learning activity. Formative assessment is used in this unit as a continuous process centered on the individual learning requirements of a student. All of the formative assessments used in this unit are authentic assessment. They all meet the criteria for authentic assessment for young children that includes process, performances-based assessment, products and portfolios as proposed by Puckett and Black (2008) and cited in (Frey, Schmitt & Allen, 2012),

The types of formative assessment used in this unit are as follows: samples of students’ written work and drawings, observations, discussions, questioning, drama presentation and self and peer assessment. By assessing samples of children written work teachers will be equipped with a set of questions to use when analyzing and conferencing with students about writing (Branscombe, Burcham, Castle and Surbeck, 2014). The analysis can span from literary to organizational quality and does not have to be limited to handwriting form or punctuation (Branscombe et al, 2014).

Student drawing represents one of the hundred languages of children and it helps them to make personal connections to their lived experiences (McCann, 2014). Drawings are used in

connection with written word in this unit as a means of assessment. This combination allows children to communicate freely. Dewey argued that words taken in isolation are not the expression; they only hint at it but the expressiveness, the esthetic meaning, is the picture itself, McCann (2014). As learners construct images and interpret them in the unit they will be communicating to the teacher their understanding of the human experience primarily because children give shape to their experiences Malaguzzi, 1998 (as cited in McCann, 2014). The symbolic nature of a child's drawing provides the means to create intentional meaning. Forman and Fyfe, 1998 (as cited in McCann, 2014) suggested that it is the "presence of this intended message that motivates children to negotiate shared meanings and to construct knowledge" (p. 249). Therefore children's drawings in this unit become critical. They act as a medium that will aid the teacher in assessing and understanding how a child shares and makes sense of their existing and new knowledge and experiences.

Observations are a form of gathering ocular evidence. This evidence can inform the teacher as to whether or not students have mastered a particular skill or ability that is required for a given grade level (Branscombe et al, 2014). To document observations teachers can use checklist or anecdotal recording. A checklist is simply a sequential listing of attributes arranged into categories and used to determine whether or not behaviours are exhibited (Ratcliff, 2001). The checklists used in this unit have been redesigned by teacher to reflect particular attributes. These checklists have been constructed based on researched findings cited in the literature review of this study; whereas anecdotal recordings are a means of writing observations for future analysis.

Discussion is used both as a pedagogical and assessment strategy. Discussion as formative assessment provides students with an opportunity to widen the breadth and depth of

their understanding while allowing them to discard erroneous information. Discussion is linked to questioning in the form of triadic dialogue. The right questioning can immediately unveil the understanding or misconception of learners. Hall and Walsh (2002) examined research which found that irrespective of class size, level and school the one particular pattern of interaction that typifies the discourse of western schooling from kindergarten to university is the teacher-led three part sequence of Initiation-Response-Evaluation (IRE). Teachers can choose to expand student thinking by asking them to explain, justify, clarify thoughts and make connection from their responses by moving beyond the simple evaluation that occurs within the IRE to the Initiate-Respond-Follow/Feedback (IRF), Hall and Walsh (2002). Feedback therefore goes beyond sending a message as it can become a consequence of performance Boyle and Charles (2014). Boyle and Charles (2014) argued that as formative assessment- feedback functions as a powerful tools to address misconception, not a total lack of understanding, as “the pupil has no way of relate the new information to what is already known.” (p. 109). The planned sessions of teacher-student conferencing will facilitate one-on-one discussions between teacher and learner. This platform will provide an opportunity to give rich descriptive feedback to students, as well as giving them a voice as co-creator of this entire process. Such feedback has the potential to bridge the gap between what the learner can do with assistance and what they cannot do without assistance.

Two key types of formative assessment used were self and peer assessment. Both types of assessment help to support higher order thinking as critical, creative and innovative thinking. This occurs when students are allowed to reflect on and evaluate their own work as well as those of their peers. Assessment as learning manifests in the classroom as self-assessment. Self-assessment provides the process means by which assessment is used as a process to develop and

support the awareness and understanding of students personal thought processes. (Earl, 2013) argues that the student is not just a contributor to the assessment and learning process but the critical connector. Self-assessment allows students to use the regulatory process in metacognition. (Earl, 2013) argues that this occurs as student act as “active critical thinkers, makes sense of information, relate it to prior knowledge, and use it to construct new knowledge” (p. 28). The self-regulated learning played a significant role in this unit. Its inclusion is supported by the work of (Clark, 2012) who argued that self-regulatory learning helps learners obtain the adaptive and autonomous learning characteristics needed to enhance engagement and successful performance in the learning process.

Peer assessment requires that learners take responsibility for assessing the work of their peers based on agreed criteria. This allows student to act as assessors and therefore, will develop a better understanding of content as opposed to just knowing the content. This implies that the student will begin to expand their metacognition and that of their peers. This will be facilitated as learners help each other make sense of the gaps in their learning and understanding (Spiller, 2012). This is a method of formative assessment that also fosters collaborative learning as learners work together within a community of practice (Boud and Falchikov 2006) During self and peer assessment pupils will begin to make decisions based on discussed and agreed standards collaboratively, thereby, building a community of practice.

Apart from assessment this unit is mindful of the developmental needs of the children in the classroom in which it will be implemented. Early childhood is a period of life that spans from birth to eight years old (Gordon and Browne, 2015). As a result, the foundations set by the early philosophers as Forbel were used to outline the interactions that support and facilitate learning at this level. (Early Education 2012) has identified play and exploration, active learning and

creativity and thinking critically as characteristics of effective early education. This is the fundamental reason for the procedures used in enacting this curriculum. This unit is done in an emergent style. Queensland Curriculum and Assessment Authority (2014) describes emergent curriculum as one that was developed for exploring what is relevant, interesting and personally meaningful to the learner. It can be cyclical, flexible and responsive as both learner's and teacher's thinking becomes visible. As a result, there are activities in this unit that will remain open ended because it is dependent on the interest of learners.

This unit unfortunately did not arise out of solely altruistic motives. As a teacher I wanted to change the lack empathy displaced by students. I am of the view that a lack of empathy is one of the factors that contribute to their lack of sensitivity and concern for the feelings and physical safety of their peers. Also, the unit will serve to develop my professional efficacy as I seek to become a more reflective professional with a bias for action. My view is that the combination of Design Thinking approach and PCR will be a good means by which my professional objectives creating young learners equipped with 21st century skills. This unit will serve to either prove or disprove this view.

Research unit architect

This unit has been divided into six broad activities. These activities will be delivered over a period of six sessions. The (Curriculum Planning and Development Division, 2013) recommend that 50% of the time be allotted to Literacy and Numeracy components and the other 50% of the time be allotted to the remaining subjects. To facilitate this unit a portion of the time allotted for subjects outside of the Literacy and Numeracy components will be used to implement this unit. An estimated time for completion of each activity is 20 to 25 minutes. It is not until the unit is actually implemented that I will be able to determine whether or not the estimated time is

sufficient. Also, due to the emergent nature of this unit the actual resources used for some activities will not be known until children and teachers engage in their discussions during the activity.

Each pedagogical practices outlined in this unit is supported by research that speak to the PCR curriculum guide and the principle of the design thinking approach. Activity 1 begins with storytelling delivered in a shared reading activity. Reading aloud is a strategy outlined by the PCR Teacher's Guide. The use of a story will be very helpful in taking children on an imaginative journey. The process of telling or reading a story exposes each child to new vocabulary and concepts.

A story that is appropriately told to children will take the child into the life of the characters. Pictures, dramatizations and the imagination process involved in a story can provide a visual of the behaviours we want children to display, understand or pattern as they resolve challenges (Murphy, 2013). A familiar story will be used to enhance the visual learning that takes place during storytelling. The story then formed the context for introducing the human condition that children will explore later in this unit. The ability to imagine is a core behaviour involved in field of design. Involving children in the real life challenges faced by the characters in the selected story was a direct strategy. This strategy was used to elicit empathetic feeling for a real life human plight but in the safety of an imagined setting.

All of the activities of this unit will require the teacher to engage students in a great detail of discussion. Discussion is a strategy that seems to dominate both the procedure and assessment protocol of this unit. The domination of discussion as a pedagogical strategy is supported by the work of Lev Vygotsky. The relationship between language and thought was researched and discussed by prominent psychologist Lev Vygotsky. He recognized that language involves a lot

more than talk. (Mc Leod, 2014) language is a human's greatest tool in communicating with the outside world. Two critical functions of language from a Vygotskian perspective are language as a means of transmitting information between parties and language in itself is a powerful tool of intellectual adaptation (Mc Leod, 2014). Vygotsky argued that thought and language are internally separate systems from the beginning of life but by age three these functions begin to become interdependent: thought transforms to verbal and speech transforms to representational (Mc Leod, 2014).

Vygotsky was lucid in explaining that inner speech is a function in itself and not an aspect of exterior speech, (Mc Leod, 2014). Inner speech is mainly thinking in pure meanings; Vygotsky was cognizant of the important role internalization of language played as a one of the driver cognitive development (Mc Leod, 2014). Teachers can model behaviour and provide verbal instruction to their students to scaffold them during their quest to better understand the actions or instruction given. This is at the core of social interaction.

Specifically, social interaction that facilitates cooperative and collaborative dialogue promotes cognitive development. Thus, Vygotsky describe a zone where the knowledgeable other can guide and encourage the learner as they develop skills that they would not have been able to master without the knowledgeable other, this zone was coined Zone of Proximal Development (Mc Leod, 2014).

The various components of the visual and performing arts will be explored in this unit. This inclusion was done on the premises that by allowing children to be engaged in the various components of the visual and performing arts they will derive cognitive benefits. (Kuby, 2011) explain the link between critical thinking and the performing arts- specifically role playing. Role

play is an opportunity for children to take on multiple perspectives, teachers can encourage critical thinking by questioning children during this process (Kuby, 2011).

In a report that examined how art education benefit student achievement has provided support for this unit. The report found that cognitive skills as reasoning ability, problem solving skills, creativity and inventiveness was improved when children participated in the arts (Ruppert, 2006). The report also highlighted that integrating the arts into a comprehensive education reform strategy lead to positive change in the school environment as well as improves student performance. A critical component of Design Thinking approach is allowing children to engage in actioned imagination. Actioned imagination translates to acting upon ideas regardless of complexity, liberated by their creativity, deep and meaning in their understanding of how their world works and their role in changing their world (IDEO 2009).

Research Unit

The Big Idea

The big idea that stood out in the story of Jack and the Beanstalk was explored. After a read aloud activity, children discussed the issues that emerged from the story. The civic concern of poverty was identified. The issue was reintroduced to children in the form of a challenge.

The Challenge:

“How can we help the Jack’s mother feed her family?”

Table 4

Research Unit

Activity Focus	Design Process Model	Unit Objective	Curriculum Connection
Briefing	<p><u>Empathy</u> <u>1. Understand</u> Discuss the behaviour of Jack and his mother Discuss how they feel when items were stolen from them Discuss the underlying reasons for stealing Discuss why Jack’s mother would sell her last cow Discuss why Jack’s mother would be angry when Jack returned with the magic beans</p>	<p><i>At the end of each stage in the process:</i> Explore pupil’s personal perceptions of Characters’ feelings during particular events in the story. Depict (using a medium of your choice) what pupils would have done differently</p>	<p><u>Literature/Creative Writing</u> Reading of the story of Jack and the Beanstalk Identify characters Discussion of the behaviours of characters Assess the moral issues in the story Brain / sketch storm ideas <u>Oral Communication</u> Respect the viewpoint of contributors <u>Visual and Performing Arts</u> Use skill to taught to depict a particular behaviour</p>
Brain storm/ sketch ideas	<p><u>2. Observe</u></p> <ul style="list-style-type: none"> • Describe how poverty affects people in a short video • Discuss poverty • Illustrate the impact of poverty humans • Retell the story of a poor person • Make a prediction on the future state of the poor if they are not helped 	<p>Analyze the impact of poverty in the lives of humans Assess the impact of poverty on humans when others who are not poor remain inactive</p>	<p><u>Writing</u> Engage in pre-writing and pre-sketching sentences on the topic of poverty Use knowledge of conventions of writing to construct sentences Examine written work looking for errors. Share sentences with peers Make correction to sentences when needed Oral Communication Character and Citizenship</p>

			Media Literacy VAPA
Develop ideas	<p><u>Define</u></p> <ul style="list-style-type: none"> • Focus students' questions on issues that emerge from the empathy stage. • Develop actionable problem statement based on student point of view. 	<p>Generate content relevant questions that will help students narrow issues</p> <p>Justify the relevance of question</p>	<p><u>Writing</u></p> <p>Use question marks</p> <p>Use appropriate words to construct questions</p> <p>Illustrate questions generated</p> <p><u>Oral Communication</u></p> <p>Respect the point of view of others</p> <p>Display appropriate listening behaviours for sustaining periods of time</p>
Selected Ideas of interest	<p><u>Ideation</u></p> <ul style="list-style-type: none"> • Develop plans from selected ideas • Consider multiple possibilities to come up with a variety of solutions • Share plans with peers 	<p>Engage in divergent thinking by selected questions that each pupil will like to widen</p> <p>Work cooperatively in groups with peers who hold the same interest</p> <p>Combine ideas to devise a plan of action</p>	<p>The curriculum connection that will emerge from students and will depend on the ideas generated by student</p>
Develop prototype	<p><u>Prototypes</u></p> <p>Construct prototype</p>	<p>Discuss materials that will be needed</p> <p>Use materials available to make prototypes</p>	<p>The curriculum connection that will emerge from students will depend on the ideas generated by student</p>
Presentation/Demonstration	<p><u>Testing</u></p> <p>Present prototype</p>	<p>Engage in role playing</p> <p>Public speaking</p>	<p>Use drama, dance, musical, visual and performing arts conventions, techniques and technologies to create an imaginary</p>

world to operate
prototype

Unit implementation

Before the unit implementation. Prior to implementing this combined unit I did extensive online training sessions conducted on <http://dschool.stanford.edu/dgift/#crash-course-video>.

In constructing this unit I tried to ensure that the unit outcomes are in keeping with the outcomes as described by the Primary Curriculum Guides (2013) and that of design thinking approach. I selected the students that I would focus on during the activity sessions, see Table 2. I used student test results and my experiences with the students to guide my selection of students.

During the unit. The unit was designed to be delivered in 6 activity session, the lessons/activity plans have been outlined in appendix A1. In actuality only 5 session was done. The final session was combined. The first activity/ lesson was an interactive storytelling session. The children were ready with questions for each other. They challenged each other and helped each other make sense of the story and the behaviours of the characters. The children choose to use roleplaying to demonstrate their understanding of the issues being explored. After the session the students engaged in a mini conference with me.

As I examined the sample of work and conferenced with students I got some revelations into their thinking. This session helped me to understand the student ideas about solving poverty. They explained that giving money will help Jack's mother and all poor people. I also realize that very few students placed themselves in the role as problem solvers or helper. They expressed the view that it was someone else problem. As I listened to their view point it reinforce the need to implement design thinking, so my students can begin to think of themselves as part of the solution and not just give money for someone else to solve the problem.

Session 2 began with another lively discussion. They shared their parent's view that poor people need to stop being poor. So, when the video was shown they all remained quiet. The video was played twice on the student's request. This video in my opinion softened the harsh views of the poor expressed by the children earlier. It was interesting hearing their views of the homeless and dilapidated homes they saw in the video and their neighbourhood. Coming out of the video a group session followed. Hearing the discussions that emerged from the students shocked me. They respected each other's work, really listened and questioned each other. By the end of the poster making activity I was able to gather rich data from group observations of one particular group. The level of collaboration among students was astonishing to me. They knew each other's strengths and weaknesses. This activity took almost the entire day. The delays were many but the students were so engrossed in the activity that they did not want to stop.

Activity/lesson 3 begins with a discussion about the posters. To my surprise they were very passionate about the messages in the posters, see appendix A2. Based on their responses I could tell that the impact of the video was significant. The students used the information from the video to reference their answers to questions about the poverty and in their dramatic presentations. The attendance was poor but the activity continued. Each group presentation was based on the video that was shown in the previous session.

Upon reflection, I felt that the poor attendance warranted a second try at the activity from session 3. So I developed a combined activity. Apart from bringing back the group activity I opened the activity to offer students an opportunity to choose their form of presentation. This time students decided to do dramatic presentations and sing. Only one group was totally off by singing a popular soca song that had no relevance to the topic. All the other groups were on target. They performed pieces that were relevant. Session 4 began after lunch and the students

were replete with ideas, they transferred their ideas from thoughts to words and then drawings. The concepts of design thinking began to really take shape the children discussions were quite good. However, in the drawing and writing some pupils allowed group think to overshadow their ideas. While others were adamant not allow anyone to cloud their point of view. The independent thinkers knew exactly what they need to make their prototype.

Sessions 5 and 6 occurred on the same day. This occurred because only two children went on to make prototypes. They were able to accept help from children from standard one. They accepted the help without giving up their leadership of their prototype. After they completed their prototypes they took it upon themselves to test, explain and demonstrate the use and purpose to classmates and anyone who would listen to them. This activity did not require much work from me. I took on the role of a supplier, providing resources upon request. By the end of the session I saw the impact of design thinking and how effective it is with PCR.

Chapter 5: Presentation of Findings

Introduction

During this study, the findings have been directly linked to research questions. Data for research question 1 was gathered from my reflective journal. This journal constitutes a rich source of data as it documents my challenges, triumphs and lessons learnt during almost the entire action research. It will be presented as excerpts. From which a thematic analysis has been conducted. This reflective approach to the research is indicative of qualitative research. The goal of taking a reflective stance seeks to unveil to the reader the constructed nature of research outcomes, which originated in the various choices and decisions taken by the researcher during the research process (Ortlipp, 2008)

Whereas the data for research question 2 will be displayed as tables, pictures of students work and transcripts of short interviews done during student teacher conferences. These tables will then be interpreted. Some verbatim will be used to support themes. I am hoping to accomplish two goals. My first goal is to share the participant's voice. I am of the view that this is a poignant means of sharing the voices of the participants. My second goal is to support the credibility of the findings and by extension the study.

Research question 1

1. What challenges would be derived from implementing a unit that combines the design thinking approach with PCR?

The entire reflective journal can be found in Appendix D. Excerpts from the journal that support specific themes has been identified for analysis in table 5 of this chapter.

Table 5

Pre-implementation Codes and themes

Code	Theme	Excerpts
		Pre-Implementation
Lack of training	Teacher Training	I am concerned because I was never formally trained in the implementation of a design thinking unit.
		I cannot determine if it has been fear or reality but I am just realizing that I am about to implement an approach I only read about. I must be crazy my entire Masters and future is resting on something I have read about. I followed along training sessions from the website http://dschool.stanford.edu/dgift/#crash-course-video
		Was I being true to the core content of PCR? At first blush this research unit does not seem to directly touch on the content to be covered in any of the core subjects?
Knowledge of the methodology self-efficacy issues		Some questions filled my mind as I constructed this research teaching unit. One such question-was I being true to the tenets of design thinking and my students?.
Availability of resources	Resources	Thanks to the Lord, I own the technology based resources because the school has some available resources that I don't have access too. My Samsung touch screen is the only available technology visual platform that I have access to. My children and I have grown accustomed
		The school was given a massive stereo system, 52 inch smart television and three projectors but no computers or internet
Access to resources		we teachers can only use the television and stereo but we do not always have access to the room in which it is kept

Teachers expectations of students	Teacher's belief about students' abilities	I expect the children to be as talkative as ever, open to drawing, colouring yet shallow in their responses.
Low expectations of children's abilities		I know that I will have to probe these children because they will ask shallow or unrelated questions.
Self-efficacy-deliberations Constructivist thinking	Professional Competence/Confidence	I am considering writing some questions before hand but I opted not to write any questions. I have to allow the children's interest to emerge and lead the conversation.
Curriculum connection		However, in the Visual and Performing arts (VAPA), Citizenship Character and Values Education, Literacy domains (creative writing, grammar and much more) structure I have found some connection. Some of the content will be touched from those areas. Should I have used some other topic to investigate that would draw from more subjective areas?

Table 5 outlines the codes that emerged from the researcher's journal. These codes have been fine tuned into themes. The supporting expert's for each theme has been included in the Table 5. Coming out of the pre-implementation of the research unit five themes emerged. These themes are as follows: Teacher Training, Professional Confidence, Resources, Teacher beliefs about student's abilities and Professional Competence. These themes all speak to the challenges I encountered during the development of the research unit. Each theme speaks to a different dimension of the challenges I encountered.

Theme 1- Teacher training

During the planning for the research unit many issues arose that made me question my training in two main areas. Firstly, I questioned my knowledge and understanding in the development and execution of design thinking approach and PCR. The realities of not having formally been trained in the process concerned me greatly. As a result, I questioned every decision I made about the unit. I began to question my professional efficacy. As this challenge arose I believe that I began to truly understand the concept of the self-fulfilling prophecy. Had I received training in the design thinking approach my professional confidence may have been higher. Min et al. (2012) creates a direct nexus between teacher confidence and training. Min et al. contended that higher understanding of professional content will influence a teacher's confidence. I knew that I had to remain positive and press on. Keeping my expectations high at all time was difficult. It was difficult to remain positive in my decisions and thoughts about the path that I had embarked upon. The decision to divide the first component of the design thinking framework was one such decision. After reading numerous articles about the process I opted for the safe avenue. I break the first element of design thinking into two sessions. Ensuring my students understood the impact of issues shaped my decision greatly.

Additionally, my knowledge of how far I can stretch PCR began to scare me. Most of the studies regarding design thinking were not based on an action research methodology. So, during my search of research studies on design thinking I was limited to focusing on examining and interpretation of classroom photos, experts from teachers and researcher's descriptions of some aspects of implementing the design thinking approach. This theme (teacher training) highlighted the value of proper training because in its absence one will have to rely on their own understanding. Sargent (2011) found that ample access to teacher professional development is a

prerequisite to raising teacher quality. The challenge experienced in this theme of teacher training would have directly or indirectly impacted on the length of my planning time and place the quality of the unit into question. As such, each decision taken during the planning had to be supported by documented research. This challenge forced me to get the process as close as possible to the requirement established by the research.

Theme 2- Resources

The theme of resources manifested from two issues namely availability and access during the pre-implementation plan. The school has high quality resources such as, video camera, projectors, screens, 52 inch flat screen smart television. But teachers do not have access to these resources. This brings into focus the issue of teacher's general use of technological equipment. The spirit of PCR and design thinking requires the use of technology to aid the pedagogical practice. Hu, Fuentes, Wang & Ye (2014) found that a lack of resources can create a challenge for teachers involved in the paradigm shift from traditional to contemporary educational approaches. Thankfully I got access to said equipment. However, if I did not have access to the equipment I would have had to purchase the said equipment or exclude the said equipment from my study. Fostering innovative thinkers isolated from technology does not augur well for the creation of learning ethos that supports tenets of innovative thinking.

Theme 3- Teachers belief about student's ability

An examination of my thoughts, perceptions and presupposition about my student's abilities were rather shocking. I did not realize that my negative expectations of my student outnumbered my positive expectations of them. This made me wonder if I manifested any negative non-verbal cues to my students. My past experiences with them shaped my present

concept of them. I had to keep in mind that the self-fulfilling prophecy can affect them as much as me. Rubie-Davies, Peterson, Sibley & Rosenthal (2014), found that student performance improved when teachers were trained in the practice of high expectation. I have to work on creating a positive ethos to support the scaffolding of students in order for them to strengthen their cognitive and social competences. Research has revealed a need to work on improving my expectations of my students so they can begin to truly exploring their capacity to engage in innovative thinking skills.

Theme 5- Professional Competence

Curriculum enactment is a critical part of a teacher's portfolio. The theme of professional competence highlighted the dilemmas that I underwent while constructing the unit. I did not want to stray too far from the tenets of the design thinking approach. Also, I wanted a topic that affects us all, so the challenge was born. Yet it was not until nearing the end of the unit that I realized that a core subject as mathematics was excluded. This prompted a re-examination of the curriculum guides to find a connection. This theme points squarely at another challenge, namely teacher training. If I had received proper training or even had a coach to guide my journey I would not have made such a novice error. Yet, I am beginning to wonder if it was a significant error at all. It is impossible to teacher all nine areas in such a short space of time and within the parameters I had set for myself. Only the actual implementation in my opinion holds the key to resolve this issue.

During the implementation process a number of themes emerged, Tables 6 to 8 outlines the codes that were condensed into themes. These themes are postcolonial philosophy, teacher's misconceptions, time management, resources, learner's traits and researcher's dilemma. In addition to each theme, the tables also display the supporting excerpts for each theme. Each

theme speaks to challenges that emerge during the implementation of the research unit that can be found in chapter 4.

Table 6

Implementation coded and themes

Coded	Themes	Excerpts Implementation
Teacher's perceptions about pupils	Post-colonial Philosophy	<p>Did I secretly believe that my children are unable to independently and critically think about topics of interest without me telling them or leading the conservation?</p> <p>I learnt to trust that my students will critically take ideas apart, listen to the chatter,</p> <p>Doing the activity I was really a facilitator of knowledge and not the giver of knowledge. The children took center stage. I am questioning why this feeling seems so new to me after almost nineteen years in the profession.</p>
Traditional teaching practices		<p>I consciously realized that even though I am a preacher of the postmodern philosophy, but when the 'rubber meets the road' I am a postcolonial teacher at heart. During the activity I wanted to control the time spent on each aspect of the activity, for example the questioning, who would respond, and expand on questions but their responses were so quick that I just had to stand and spin in the wind of questions.</p> <p>.</p> <p>At the end of the session I selected a student to speak on behalf of their group. In reflection, I should have allowed them to select their own presenters.</p> <p>.</p> <p>I wanted all of my children to automatically start 'creatively destroying' when they have been thought to follow the mandates of their teacher.</p>

<p>Consideration of modern practices</p>		<p>What would have happened if I had open the activity to allow them to select their medium of representing (sing a song, dance or poem) their knowledge?</p>
		<p>I just reminded them of the criteria..., I should have asked the entire class to help the group change the words around to make a 'Ola' about poverty</p>
<p>Students ability</p>	<p>Teacher's Misconception</p>	<p>To my surprise the talk they engaged in was related to the topic under discussion.</p>
<p>Teachers expectations of students</p>		<p>I stopped trying to move them along and just sat and watched them complete their drawings and sentences. I heard meaningful discussion. I saw them helping each other and pointing out errors.</p>
<p>Teacher fallacies about students</p>		<p>...what a shock I received, my students were able to take the issues apart without me really</p>
<p>Student's emotions</p>		<p>What I did not factor in was their enjoyment. They are also very shy.</p>
<p>Activity Timing</p>	<p>Time Management</p>	<p>I was focused on the time. I focused on the time because I knew that they would have lost interest in the activity. As time marched on they still want to continue with the discussions and later their drawings</p>
<p>Use of time</p>		<p>Today's activity took the entire day. My 25 minutes stretched from 9:30am to 1:45pm</p>
<p>Dual duty</p>		<p>I wanted them to stop talking. During the activity I recalled that I was focused on the time.</p>
<p>Use of time</p>		<p>I have realized that subconsciously I have been racing to complete task. This must have been impacting on my effectiveness as a teacher.</p>
<p>Dual duty</p>		<p>I never really noticed the impact of being a Senior Teacher on my time and practice before now</p>

Table 7

Implementation codes and themes continued

Coded	Themes	Excerpts
		Implementation
Technological support	Resources	It was also hindered in my mobility and peripheral focus. However, when the audio recorder was used I got lively discussions
Appropriate resources		Tomorrow I will use the audio recorder instead of the video recorder. It will be interesting to see how the effectiveness of the audio recorder as opposed to the video camera.
Shortage of resources		During the activity I could not see or hear all the groups at the same time because I only had one recorder
Peer influence	Learners' Traits	I found it very disappointing that the groups are all just agreeing with each other.
Willingness to take risk		May be it will take some time before they feel safe enough to present differing points of view
Value of personal experience		When the camera was videotaping the children grew silent and refused to interact.
Staying on task		In order to open their imagination I had to narrow the scenario somewhat... I asked the children to think about machines that can help Jack's mother as she worked on the farm. They got excited and said "something like transformers" (a popular movie)
Clarity of task		I am realizing that four students could have explained what they drew. The rest just engaged in blind group think or drew whatever they saw their peers drawing regardless of relevance to topic
		Two of the four children with clear plans from activity four came to school

Table 8

Implementation codes and themes

Coded	Theme s	Excerpts Implementation
Allow group interaction or not	Researcher's Dilemma	I was angry with myself for allowing them to work in groups to do their drawings because there are some strong personalities who dominated the group. They all just did the same tractor
Teacher's or researcher's burden		Guilt filled me because for more than a quarters of the participants have been their only teacher. So if I found that they were not innovative I had no one to blame but myself
Poor attendance		I had a poor student turnout at school today...For some reason I never considered students absence as a limitation of the study but classroom action research generally require your students presences
Partial or impartial		As I am sitting here thinking the word AXIOLOGY popped into my consciousness. Would I be minimizing my bias? How transparent would that action be? Would I be trying to change the outcome of the study? Was I trying to ensure that their work was perfectly tailored?
Personal influence or researcher's influence		Was I taking this study to personally? May be I am too close to it to be objective? Or am I so post-colonial that the ideas generated by the students must be in keeping with my ideas about 'creative destruction' as defined by Schumpeter?

Theme 6 Postcolonial Philosophy

This theme pointed to serious gaps between teacher practice and curriculum requirement. During the implementation of the unit I realized that I held on to some vestige of teacher centered pedagogical practice. In my role as teacher during the sessions I tried to control the students. For instance, in one of the sessions I selected drama as a mandatory activity instead of allowing them to make their own choices. This typifies the traditional teacher centered strategy

in postcolonial. Traditions and norms are among some of the biggest obstacles hindering educational change in Trinidad and Tobago (Steinbach, 2012). Steinbach argued that some of these traditions and norms are imbued in the education landscape of Trinidad and Tobago. Steinbach further added that "...society is living under the effects of a foreign colonialist culture without fully realizing the far reaching details that influence so many aspects of their societal structure" (p. 74). This theme was indeed a leviathan of teaching for innovative thinking.

Theme 7 Teacher's Misconception

This theme proved to be lingering throughout the implementation of the unit. It highlighted teachers' underestimation of the developmental characteristics of the middle child. The middle child's is engaged in the crisis of industry verses inferiority and can emerge as competent, Newman and Newman (2003). Erikson postulated that children at this stage seem to have an innate drive to accomplish numerous new skills and learning in meaningful activity Newman and Newman (2003). By not taking note of Erikson understanding about the middle child my perception of the innovative thinking competences appears to have been marred.

Theme 8 Time Management

Time proved to be a precious commodity during the implementation process I did triple duty-teacher, researcher and principal. I found myself wanting to speed the activity along. I wanted the children to engage in short quick conversations. I kept losing my position in the activity, having to recap and redo. These practices do not speak to august pedagogical practices that can foster innovative thinking. In fact, Hu et al. (2014) in their study identified time constraints as one of the challenges in delivering an integrative curriculum. During the conduct of this study, time was constrained by the non-teaching duties and events.

Theme 9 Resources

In order to properly assess the implementation of this classroom action research and remain true to its tenets I should have been equipped with the right resources. These resources should have been able to capture all aspects of the classroom sessions. My audio recording device functioned as my “researcher’s assistant”. It aided in capturing valuable information from some groups as it was physically impossible for me to visit and observe all the groups at the same time. Therefore, having the right resources available and accessible would have helped to mitigate the challenges of collecting data from various groups simultaneously.

Theme 10 Learning Traits

During the implementation process the particular behaviours of students began to manifest and posed a particular challenge. In that, some participants were very unwilling to act independent of peers, take risk and stay on task. Carroll et al. (2010) found that risk-taking, expressing creative confidence in one’s voice and collaboration among peers as critical notions in the social world of some students. These notions can be used to construct the environment that can facilitate student learning and transform the learning ethos of classrooms. The challenge therefore functioned as an indicator identifying to the teacher the unique learning traits of students and any adjustments that may be needed. Having these traits made the transformation process even more challenging.

Theme 10 Researcher’s Dilemmas

There is a school of thought which advocates that teachers as researchers hinder the real purpose of classroom teaching. Many of the dilemmas identified in the study may not have been issues if the element of research was not involved. For example, under closer examination poor

student attendance would under no condition raise issues about whether or not an activity should be redone due to poor students' attendance. Academic research should not be conducted in the guise of classroom teaching, because it was difficult enough to teach effectively when one's entire focus is on teaching the class (Gentry, McGinnis, Dickinson & Burns, 2005). These challenges all speak to support systems that need to be established to support classroom teachers as they attempt to foster innovative thinking capabilities in children.

Presentation of research question 2

Research question 2

2. How would design thinking impact student innovative thinking?

Research question 2 seeks to uncover if innovative thinking took place during the research unit. This question will be answered from student generated work. Data will be gathered from observational checklist, samples of students work, and vignettes of student teacher interaction. By so doing readers will have a clear understanding of each participant and some level of context of the data being analyzed. It is my view that a collective profile of all participants be provided. Table 2 in chapter 3 outlines this profile. Embarking on this action research required the implementation of a research unit, which is located in chapter 4. The findings being presented here represents the student's work that they generated.

The following Observational checklist was used to record innovative behaviours identified in the behaviour patterns displayed by participants during the span of the entire unit. The checklist covers the five core innovative behaviours and their related behavioural attribute identified in the literature review found in chapter 2. Each behavioural attribute was ticked off each time it was noticed. At the end of the study the frequency of the ticks were noted. Table 9

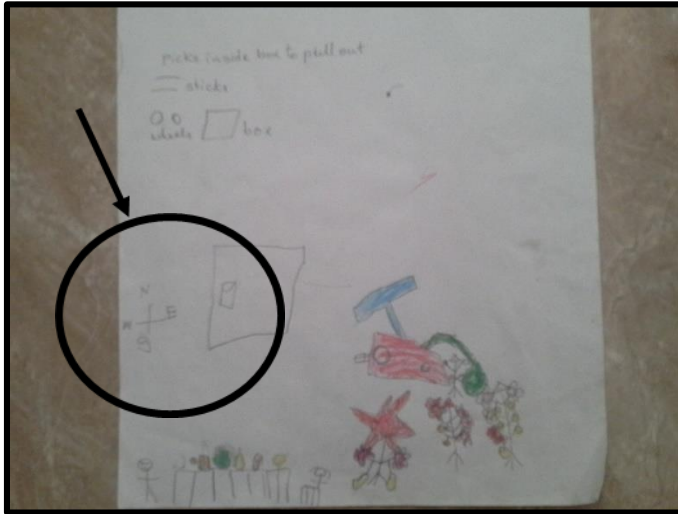
	Willingness to use various and new materials	3	1	1	1	2	2	2	2	2	2	2	2	2
	Willingness to persist at a task	3	1	3	2	1	1	1	1	2	2	1	2	1
Communication	Represented ideas in more than one form	1	2	2	2	2	2	2	2	2	2	1	2	1
	Ability to share ideas with peers	1	2	2	3	1	2	2	2	2	2	1	2	2
	Critique the work of self and others respectfully	3	1	2	3	3	1	2	2	2	2	3	2	3
	Work corporately and collaborate with others	2	2	1	2	1	2	2	2	2	2	2	2	2
Passion for topic	Ability to gather interest from others about topic	2	3	2	3	3	1	2	1	1	2	3	2	3
	Willingness to make and use prototypes	3	3	3	3	3	3	3	3	3	2	3	2	3
	Willingness to take risk	2	1	3	3	3	1	2	1	2	2	3	2	1

Table 9 depicts the behaviors that describe the features of innovative thinking. Each participant was observed and the frequency of their behaviours ticked, documented and appropriately placed on Table 9. Based on the findings presented on Table 9 one can determine that only two children did prototypes of their graphical representation. A closer examination of the behavioural attributes that describes the innovative thinking skills has reveal that children are beginning to display behaviours that can indicate their budding development of innovative thinking skills. In the category of knowledge creation all students display all the attributes of this category. This is the only category where this level was achieved. This indicates that all students had at least one encounter during the implementation of the unit. This encounter allowed them to engage in transferring their knowledge from content areas taught at school or from their experiences outside of the school and the content explored in the design challenge. Figure 2 is

artifact 1 which is a picture that depicts an example of a participant's work. Figure 2 depicts a participant applying knowledge from Social Studies and using it during this unit.

Figure 2

Artifact 1



Artifact 1 illustrates Harry's representation of his understanding of the layout of Jack's mother's farm. Encircled in the artifact is a drawing of the cardinal points. This is an indicator of transfer of learning. Social Studies curriculum requires the teaching of cardinal points. Therefore, the topic was completed. In Harry's representation he drew the cardinal points. When asked, he said "maps must have the compass to find things". His words indicated that he used his knowledge of map making as taught in class in his design challenge.

Also, observational checks revealed that each child asked at least one question. The artifacts placed in figure 3 are both experts supports an observation. Artifact 2 is a transcript and is part of a larger class discussion regarding the impact of poverty. These are two questions were asked by Mark and George (participant's pseudonyms). Artifact 2 was a question asked by Mark

and artifact 3 was asked by George who followed up on a response given by Mark's question to another student.

Figure 3

Artifacts 2 & 3



Figure 4 displays artifact 4. The following image labeled Figure 4 artifact 4 illustrates Sherry's determination to find soil. During the making of her prototype she wanted a material to represent soil but without the mess. She looked around the class saw the portugal and asked for two. When I inquired the purpose for the fruit she said "for de dirt miss"

Figure 4

Artifact 4

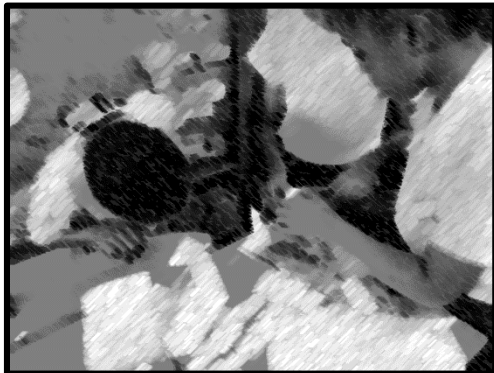


Figure 4 shows three children working together. They are trying to attach the protugal skin to paper and this is proving very difficult because the glue is not holding it to the paper. One of the children suggested to Sherry that they use scotch tape and surprisingly she agreed. They tried it and it worked. This artifact displayed how Sherry and her team were willing to seek out alternative materials and experiment with said material and persist until they found a solution. This particular artifact highlights features of critical thinking. At no point did they group give up or seek an answer from the teacher. The feature of critical thinking has five attributes. Sherry and her team manifest positive inclinations towards the attributes of critical thinking.

Within the attributes of critical thinking two students are yet to display two of the attributes. The attribute of willingness to use various and new material is yet to emerge in one student. While three children showed little interest in using various and new materials. All the other children were rather willing to use the self-assessment tool and new materials, as Sherry and her team. In the final attribute in critical thinking seven children showed that during the entire six sessions they were unwilling to persist at a task. In fact, the majority of the students in this attribute were observed to display persistence less than three times during the entire implementation of the unit. A shortened transcript of an interaction between a student and the teacher has been presented to support the observation. Vignette 1 displays a conversation between the teacher/researcher and a participant. When asked to explain his work the student did an excellent job. But when asked to expand the drawing to show the 'picking machine' in action, the child response has been recorded in vignette 1. Sheldon's response in vignette 1 clearly displays that he displayed no interest in pursuing a task.

Vignette 1

Teacher: I like your idea but why don't you draw another part so everyone can see the picking machine in action

Sheldon: (he did not speak non-verbal response with a sad expression on his face)

Teacher: Ok. Well may be you can write a sentence telling us how the machine works

Sheldon: All that!

Teacher: Well, we want others to understand how it works try it.

Sheldon: Ok. (He walked away with a blank expression on his face and did not do any further work on the

In the behaviour category of communication there were four attributes. In respect of the attribute of working cooperatively and collaboratively with others they all produced very positive results. Only two students were observed less than three times working cooperatively and collaboratively with peers. This attribute can be supported by the observations taken during two specific group activities. The attribute of critiquing the work of self and others respectfully had the highest amount of students who was not observed engaging in this activity within the category of communication. These observations can be supported by the observational checklist completed from observations of two separate group activities, namely the making of a group poster and the planning and execution of a performance. The data in the observational checklist has been placed in table 10.

Table 10

Group participation in making a poster

Collaborative and Cooperative Behaviour Attribute	Group 1 Ace Ray Ann Raymond Carla	Group 2 Sherry George Mark	Group 3 Bob Nigel Jenny	Group 4 Sheldon Harry Connie
All members actively participated	1	1	1	2
Exercise flexibility and willingness	1	1	1	2
Group members are respectful of each other	2	1	2	2
Assume shared responsibility	1	1	1	2
Values of individual contribution	1	1	1	2
Shared materials	1	1	2	2
Looks at group's work and contribution of ideas	1	1	1	2
Sticks to task	1	2	2	2

Table 11

Group participation in performance

Behaviourial Attribute	Group 1 Ace Ray Ann Raymond Carla	Group 2 Sherry George Mark	Group 3 Bob Nigel Jenny	Group 4 Sheldon Harry Connie
All members actively participated	1	2	1	1
Group members are respectful of each other	1	1	1	2
Stays with group	1	1	1	2

Shares materials	1	1	2	2
Looks at group's work and contributes ideas	2	2	1	2
Sticks to task	2	2	1	2

Table 10 and 11 outlines the participants during a group project. When any of the attributes listed in table 10 was observed then the group would have been given a point. Should a listed attribute be observed once but less than three times the score of 1 would be given. When the behavioural attributes are observed three or more times the score of 2 would be given. In the event that a listed collaborative and cooperative behaviour attribute is never observed a score of 3 will be given.

With reference to table 10 participants in group 4 worked extremely well together. This is evident by them receiving displaying the highest collaborative behavioural attributes during the activity. Group 1 and 2 performance during the group activity mirrored each other. However, in Table 11 cooperative and collaborative behavioural attributes of participants during a performance. Group 3 did not display any improvement in behaviour, whereas groups 1 and 2 showed improvement in their cooperative and collaborative behaviour. Group 4 showed a lowered performance. These tables show that cooperative and collaborative traits are evolving in participants. These traits were investigated during the unit under different activities.

Also, pictures taken of cooperative and collaborative actions during both activities showed the level of participation among participants. In all the pictures the images of participants were distorted to protect their identity. These are the images of participants engaged in cooperative and collaborative tasks.

Artifacts 5 illustrate participants working on a group poster, whereas, artifact 6 is an image of the participants planning a group presentation.

Figure 5

Group collaboration and cooperation



Artifact 5

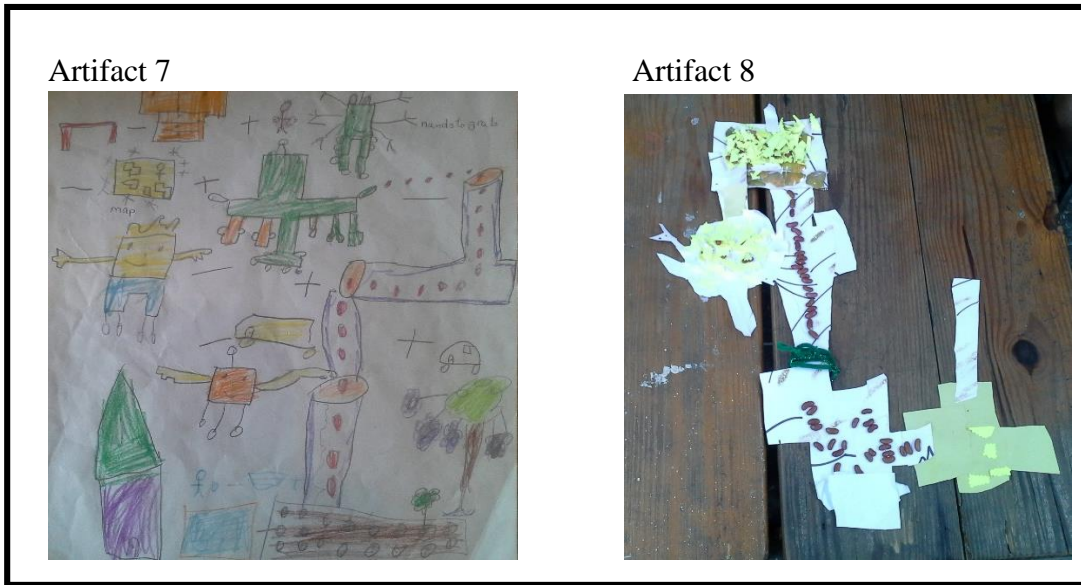


Artifact 6

In the final behaviour trait listed in the innovative thinking skills listing is termed a passion for the topic. Of all the attributes of innovative thinking outlined in the Table 7 within this category had the most children not displaying particular attributes. Firstly, only two children did prototypes, five children were willing to take risk and gather interest about their ideas but they did not persist in taking their ideas to the next level. To ensure the discussion to make the prototypes came purely from the participant, I did not make it mandatory that each child did a prototype. I did not want to force the making of prototypes on participants because I did not feel that it would have been an accurate assessment of participant's passion for their ideas. The participants who opted to make their prototype, persisted, collaborated with others and remained focused on their plan. They actually managed the helpers. Their final products looked almost

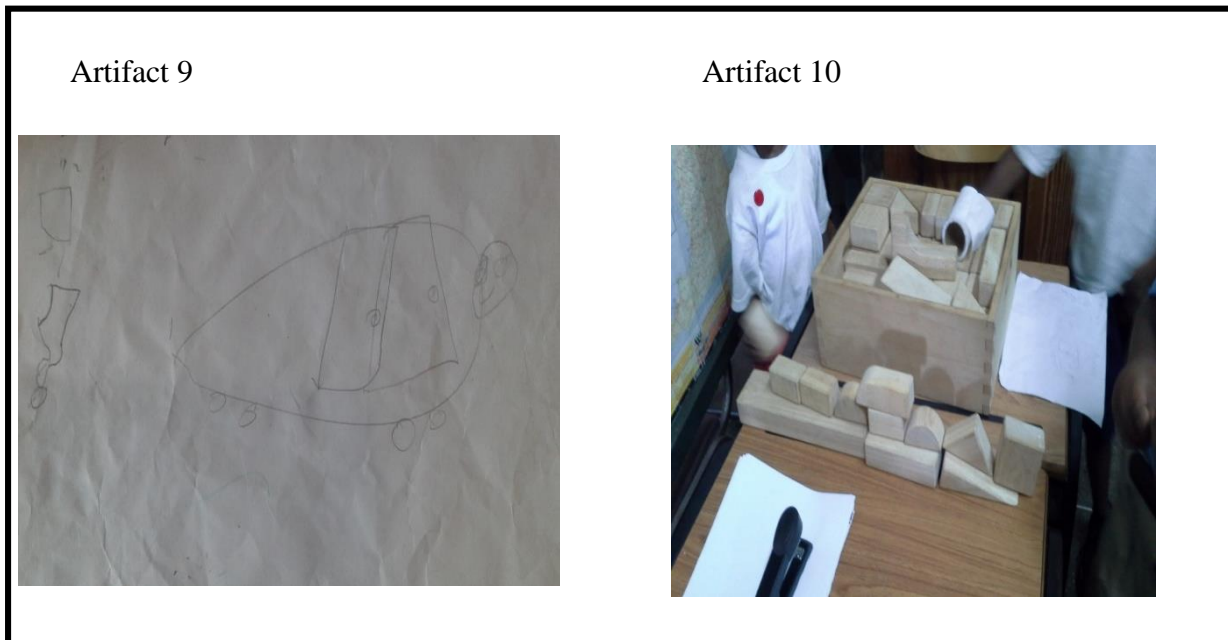
exactly like their initial drawings. Artifacts 7 and 8 illustrate Sherry's initial idea that was graphically represented and the actual prototype.

Figure 6



Artifacts 9 and 10 displays Raymond's initial idea graphically represented and the actual prototype.

Figure 7



Chapter 6: Discussion and Recommendations

Introduction

This final chapter in my study aligns findings as presented in chapter 5 to relevant and compelling literature to support these findings. These findings will be discussed in relation to their research questions. After the discussion of the findings, recommendations will be put forward to support further efforts in this particular sphere. After, these recommendations have been proposed, suggestions for future studies in this sphere will be suggested.

Discussion

When I embarked upon this study, I was resolute in my desire to use action research to investigate the effectiveness of a unit that combines the design thinking approach and PCR in the Trinidad and Tobago context. Prerequisite to my achievement of this objective was an understanding of the challenges a classroom teacher would experience from conception to final implementation. As well as determining how the design thinking approach would impact student's innovative thinking. Prerequisite to the achievement of these objectives reside in the execution of the research questions. Research question 1

1. What challenges would be derived from implementing a unit that combines the design thinking approach with PCR?

The answer to this question was found in an interrogation of my researcher's journal. My researcher's journal covers the pre-implementation and actual implementation. Emerging out of the journal are varying themes that address the challenges experienced by this researcher/teacher. During the pre-implementation stage, challenges such as teacher training, resources, teacher beliefs about student ability and professional competence emerged. These findings are in keeping with

(Sargent, 2011) argument that high quality professional development programs are needed to support teachers as they reinvent themselves professionally to meet the demands called for by reform. During the pre-implementation stage I found myself having to rethink norms and practices as I underwent the limited independent training opportunities. Due to the unstructured nature of my training my professional efficacy came into question. This opened the door for an avalanche of apprehensions and questions about students' abilities, my confidence and competence.

During the planning process I expressed the need for support. Should support have been given the professional confidence issues that were unearthed during the pre-implementation process could have been mitigated. Even the issues of self-efficacy can be linked to both training and professional confidence. Also, the impact of resource constraints had to potential to hinder the teacher's movement away from traditional pedagogical practices and strategies. The resources used in this research are supported by the pedagogical strategies outlined by PCR curriculum guide and design thinking approach. The power of teacher expectation can influence teachers' expectations for student ability. One cannot discount the impact of teacher expectations regarding pedagogical change. Kwek (2011) concluded that "Teachers' convictions are forged within the crucible of personal belief, prior knowledge of teaching and learning" (p. 27). Throughout the pre-planning stage the challenges identified has been supported by research. The work of (Sargent, 2011; Min et al., 2012; Hu, et al., 2014; Rubie-Davies et al., 2014) in various ways give credence to the challenges this researcher experienced during the pre-implementation of an integrated thematic curriculums.

For the period of implementation six themes were generated. These themes identified the nature of the challenges I encountered as a teacher researcher. These themes are postcolonial

philosophy, teacher's misconceptions, time management, resources, learner's traits and researcher's dilemma. An in-depth analysis resulted in an alignment between the literature and the findings. The impact of conducting a research study that seeks to introduce design thinking approach and the government's current attempt at curriculum reform PCR proved challenging in a postcolonial setting as Trinidad. The research of Steinbach (2012) found that outdated resources, traditional pedagogical practices and teacher-centered teaching were challenges that faced the education sector in Trinidad and Tobago. These findings are similar to the challenges that were identified in this study. The plantation pedagogy as described by Bristol (2012) began to manifest itself in the researcher's classroom. In fact, it forced me as a researcher to reassess my current practice.

Also, the challenges spoke to the impact of not seriously considering the developmental traits of the participants. The description of middle children as described by Newman and Newman (2003) aligned with the behaviours displayed by many of the participants in the study. Acting upon the understanding of the developmental attributes of the research participants as articulated by Newman and Newman would have mitigated most of the codes that lead to the theme of teacher's misconceptions.

Time management as a theme pointed clearly to the possibility of the researcher returning to traditional pedagogical practices, which are alien to both design thinking and PCR. Hu et al. (2014) supported the inclusion of time management as a challenge. Hu et al. (2014) research points to time constraints as a challenge that can cause teachers to rekindle tradition practices. Resources as a challenge in the implementation phase differed from resources as a challenge in the pre-planning phase. The role of the equipment for recording constituted a major challenge for the researcher. Whereas, the challenge posed by the learner's traits were in keeping with Carroll

et al. (2010). This challenge identified the critical notions that Carroll et al. (2010) identified as critical indicators of innovative thinking that points to a classroom environment that can foster innovative thinking. As such, the non-manifestation of some of these traits can hinder student's innovative thinking potential being manifested during the implementation of the unit. All ten themes unearth in the research speak to challenges encountered by the researcher in attempting to plan and implement the unit.

In consideration of the second research question an understanding of how design thinking approach impacted student learning. Research question 2

2. How would Design Thinking impact student innovative thinking?

The findings that were derived from observational checklists, samples of students work, vignettes, and pictures were used to answer research question 2. These various modes of data that was collected revealed that during the changes in student's innovative thinking capabilities over the period. This study highlighted the dilemma within the design thinking learning experiences. The complicated processes involved in the teaching and learning engagement of design thinking leads questions regarding an individual's actual learning, as opposed to group learning. This dilemma is further perpetuated by educational systems similar to that of Trinidad and Tobago. Goldman, Kabayadondo et al. (2014) explained that "the team process and practice is one of the sticky problems of design thinking education because courses are situated in educational systems that have emphasized and rewarded individual learning and achievement" (p. 12).

Based on the findings of the data collected from both an individual and group perspective some determinations can be made. Should an individual perspective be considered one can point to the two participants (Sherry and Raymond) out of thirteen students were engaged in all the

features of innovative thinking. This represents only 15% of the participants. However, when the findings are taken from a group learning perspective the finds indicate that all participant displayed features of innovative thinking as identified by the literature review in chapter 2 of this study. A deeper inspection of the features of innovative thinking takes into consideration the individual behavioural attributes the findings would represent a somewhat different viewpoint. The findings indicated that 85% of the participants did not display at least one features of innovative behavioural attribute.

In conclusion, the findings does not seem to bring any resolution to the “sticky problem” of assessing the nature of learning involved in design thinking as argued by Goldman, Kabayadondo et al. (2014). The collaborative nature of design thinking leads itself to team work as opposed to individual work. Yet, the assessment procedures emphases the understanding of individual assessment Kwek, (2011) that pointed out that the design thinking approach refocuses the pedagogical practices on a learning paradigm where the students assume ownership of the learning situation. PCR has the curricular frame needed to facilitate the conditions needed to increase the chance of producing the outcomes boasted by design thinking proponents. As such, creative outcomes and the building of confidence in the use of the design thinking skills are imbued in the development of empathy, collaboration prototyping and testing, Kwek, (2011).

Recommendations and future areas of study

This venture into the realm of design thinking and PCR indicate a need for further investigations into the possibilities that can such curriculum adaptations can be supported. The following are recommendations that can further expand this area of student in Trinidad and Tobago:

1. The need for ongoing professional training was quite evident in this research.
Teachers firstly need a comprehensive training sessions in planning and implementing integrated thematic approaches units within their school context. This may require district coaches for teachers. These coaches can work with individual schools to help these teachers make maximum benefit of their resources and incorporate their stakeholders. After the coaches have left the school teachers in the district can form collaborative networks to share ideas successes and challenges.
2. Training of teachers in the creation of positive classroom ethos. This training will cover social and cultural interaction, strategies to manage negative social behaviours and use of physical environment spaces facilitate effective communication initiative. This type of training will help teachers to foster open positive learning spaces. Where students can feel comfortable expressing a descending view, share ideas and challenge each other with respect and without fear. This type of environment will foster risk taking initiatives, collaboration and problem solving.
3. Address the staffing issues at primary schools. Full all teaching vacancies with qualified and competent teachers to fill the post. Have a substitute teacher system to replace absent staff members.
4. Address the infrastructural issues of the school. Equip primary school with the hardware to execute technological applications. This would involve equipping each classroom with a touch pads, smart televisions, wall mounted projectors and wireless internet access. This will ensure that teachers and students easy have technology.

This will support independent learning and help to keep activities/lesson student centred.

5. Design an assessment tool that can evaluate an individual's innovative thinking and the group learning that occurs during the design thinking process. This recommendation will help to point educators into the true impact of the design thinking approach on an individual and group innovative thinking abilities.
6. Conduct a study with the junior department in the primary school. Where a unit has been designed based on one of PCR using one of the selected themes proposed by the PCR curriculum guide. Or a student generated theme. This would require a more extensive investigations of the range of possibilities for assessing ways by which an integrative, thematic curriculum can be combined with design thinking to improve innovative thinking.
7. Conduct research studies to investigate (1) the nature of teachers' concerns about implementing a combined unit of PCR and Design thinking (2) students' and teachers' perspectives about implementation of such a unit. Studies as these will help to inform educators about the strengths and weakness of such a units.

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APPENDICES

Appendix A- Principal Consent Request

January 26th, 2015

The Principal

Primary School

Dear Madam,

I am writing to request permission to conduct a classroom action research study at your school. This study is a requirement of Master of Education Programme at the University of the West Indies. The proposed title of my study is "An action research study aimed at designing and implementing an innovative unit of instruction within the context of developing innovative thinking skills among primary school students"

I hope that you will allow me to recruit 13 students, boy 8 and 5 girls from the Infant department of the school. Once these students and their parents agree to participate in the study they will be given a consent form.

If approval is granted, students will be asked to complete task that relate to the mandates of the New Primary School Curriculum guide. Samples of student work will be collected and used in the research. The research unit has been developed to enhance my regular classroom practice.

Your approval to conduct this study will be greatly appreciated.

Kind regards,

KAREN DALRYMPLE

Appendix B- Parental Consent Form

February, 9th, 2015

Dear Parent or Guardians,

This term as a part fulfillment for my Master of Education at the University of the West Indies, St. Augustine, I will be conducting a classroom action research study. This study will help me to better teach your child. The title of the study is "An action research study aimed at designing and implementing an innovative unit of instruction within the context of developing innovative thinking skills among primary school students"

I want to assure you that confidentiality will be maintain. Your child's real name will not be use and his/her identity will be concealed. Your child will be referred to by a made up name.

If I have you permission to use your child's work in my research, please complete the approval

Kind regards,

Ms. K Dalrymple

I (we) grant permission for the use of my _____ schoolwork. I understand that every good effort will be made to protect the identity of my child in any report of this research. I understand that if I do not grant permission my child will not be a part of the study.

Appendix C- Research Activity/lesson plans

Activity Plan 1

Design Think Stage: Empathy

Introduction: The teacher will explain to pupils the objectives of the activity. Pupils are shown the storybook-Jack and the beanstalk. They will examine the cover of the book and discuss the author, illustrator and the other topics of interest that may arise.

Objectives: at the end of the activity

- Explore pupil's personal perceptions of the characters' feelings during particular events in the story.
- Depict (using a medium of your choice) what pupils would have done differently

Curriculum content connection:

Language Arts-Literary Studies, Oral Communication, Creative Writing, Visual and Performing Arts

Materials: Story book, pictures of characters, flip chart paper, various writing instruments

Procedure

1. The story is read to pupils following the guidelines set out by the Ministry of Education in the (PCR Teacher's guide, 2013 p. 28)
2. Pupils will be asked to review the plot of the story with peers. After each peer discuss the various elements in the story, pupils will be asked probing questions-both the IRE and IRF question patterns will be used as needed (they will have the choice of responding as a peer or individually) to help them to critically assess the pros and cons of the behaviour of the characters-Jack, Jack's mother and the giant.
3. Provide descriptive feedback as needed during the course of the activity.

4. Allow students to explain using the medium of role-playing, storytelling or any other method to perform their understanding of the moral issues behind the story
5. Pupils will be asked to place themselves into the mind of the Jack's mother as they depict what they would have done differently.
6. Teacher will take on the role of a scribe and record the words, sentences or ideas generated by pupils

Formative Assessment

Whole class

1. During the course of the activity the teacher will ask questions and dialogue with children to understand the children's interpretation of the content being explored.
2. Brainstorm or brain sketch the following scenario: How can we let people without food (or whatever poverty indicator pupils identify) know that we care about them?
3. Explain the pros or cons of their peer's choice of space for exhibiting their work in the specified space in the classroom.
4. Pupils will be asked to use self-assessment chart to check for errors in their work.

Individual

Students will meet with their teacher for a conference

Follow-up

Teacher presents pupil with the following situation:

“How can we help parents with no job feed their family?”

Home/School Link

1. Discuss the Design Challenge with family and friends

Activity 2

Design Think stage: Empathy

Objective: at the end of the activity

- Analyze the impact of poverty on humans
- Assess the impact of poverty on humans when others who are not poor remain inactive

Introduction: Pupils will be asked to walk around the classroom and reflect on the work produced by themselves and their peers. When they return to their seats they will discuss what they observed with their peers.

Curriculum Content Connection:

Creative Writing

Materials: Video that depicts persons living in poverty

Procedures:

1. Discuss with pupils the information they gathered from discussions with family and friends. Allowing pupils who wish to contribute the share what they learnt.
2. Have pupils view the video. Teacher narrates the video when needed
3. Pupils are encourage to discuss the video with their partner and then the entire class.
4. Pupils were asked to identify and explain their understanding of the indicators of poverty identified in the video. Teacher records children's contribution
5. With their partners pupils were asked to discuss what do they think will happen if no one help the poor.
6. In an open forum pupil are asked to share feelings about a time when they helped someone or received help from someone.

Assessment:

Whole class

1. Pupils will be asked to make a poster that gives people one reason why they should help the poor.
2. Use self-assessment checklist to edit sentences collectively.
3. Select and justify where this poster will be displayed.

Individual

Students will meet with teacher for a conference

Follow-up:

Think about what we can do not to help the poor

Home/School Link:

Discuss with family and friend reason why we should or should not help the poor

Activity 3

Design Think stage: Define

Objective: at the end of the activity

- Generate content relevant questions that will help students narrow issues
- Justify the relevance of question

Introduction: Discuss whether or not they felt that the posters that they made were important or will be helpful. Express in any appropriate form of their choosing some of the reasons for or against helping the poor.

Curriculum Content Connection:

Writing, Visual and the performing arts

Materials: (whatever props students' request)

Procedures:

1. Discuss the reasons given by peers in the introduction
2. Teacher writes pupils' ideas and ask probing questions using the IRF mode to understanding the pupils' interpretation of issues under discussion.
3. Pupils are asked to give their ideas about how they can help the poor get food (or any other items they may need) using the following guides:
 - a. What does the poor need to get food (the word 'food' can be substituted for another poverty indicator)
 - b. Why is food important?
 - c. Should we always give them or help them to get it for themselves?
 - d. How can that work/help? (If the child cannot clarify their point, the teacher will record their confusion and it will be explored at a later time)
 - e. How can we build on what he/she said?

Assessment:

Whole class

1. Form groups to plan and present a short dramatic presentation of the consequences of not helping the poor
2. Provide peers with descriptive feedback about their presentations.

Individual

Students will meet with their teacher for a conference

Follow-up:

1. What can we do or make to help change the life of the poor?

Home/School Link:

1. Inform family and friends about ways of helping the poor

Activity 4

Design Think stage: Ideate

Objective:

- Engage in discussions as they conceptualize questions of their choice to operationalize
- Work cooperatively in groups who hold the same interest
- Combine ideas to devise a plan of action

Introduction: Walk around the class and reflect on their work. Then share why they believe their idea is a good one and will help the poor. Allowing pupils who wish to contribute and share how they felt.

Curriculum Content Connection:

(The curriculum content connection will emerge from pupil discussion)

Materials:

Procedures:

1. View clips of the different performances from the grivand comment on the issues depicted in each clip.
2. Brainstorm with group member's ideas on specific problems
3. Share ideas freely among the group
4. Explain how they perceive ideas
5. Record each ideas in drawing

Assessment:

Whole class

1. Discuss the issues that arose during the activity
2. Explain and make needed adjustments to their ideas on paper.

Individual

Students will meet with teacher for a conference

Follow-up:

Think about how they actually make their idea actually work

Home/School Link:

Explain their plan with family and friends

Activity 5

Design Think stage: Prototype

Objective: at the end of the activity:

- pupils will construction their idea

Introduction: Share why they believe it is a good thing to help the poor. Allowing pupils who wish to contribute the share how they felt.

Curriculum Content Connection:

Visual and Performing Arts (Depending on students interest)

Materials: (Depending on students interest)

Procedures:

1. Teacher briefly explain the concept of a prototype
2. Discuss the material you all will needed to make you prototype
3. Pupils make a list of the things they will need
4. Collect materials and make prototypes
5. Pupil to construct their prototype

Assessment:

Whole class

1. Discuss the issues that arose during the activity
2. Explain the actual process involved in the making of the prototype

Individual

Students will meet with teacher for a conference

Follow-up:

Think about how their prototype will actually work

Home/School Link:

1. Discuss the making of the prototype with family and friends

Activity 6

Design Think stage: Testing

Objective: at the end of the activity

- Engage in role playing as they explore the possibilities of prototype
- Present prototype to the entire class

Introduction: Discuss with pupils the information they gathered from discussions with family

and friends. Allowing pupils who wish to contribute to share what they learnt.

Curriculum Content Connection: Will emerge from the interest of students

Materials: Will be provided based on student interest/need

Procedures:

1. Play with your prototype.
2. Tell members in your group how their prototype will work

3. Listen and given an opportunity to act on feedback from peers
4. Discuss how prototype can be presented to the school
5. Make labels and compile all writings and drawings of the entire Design Challenge
6. Review and reflect on all of their writings and drawing.
7. Exchange work with peers for them to review and comment
8. Discuss the medium in which they will use to display their prototype

Assessment:

Whole class

1. Share whether or not the prototype meet their expectations.
2. Provide feedback to peers about their prototype

Individual

Students will meet with teacher for a conference


Follow-up:

Think and discuss all that you have learnt about poverty and helping the poor

Summative Assessment



1. Complete the following template

We can stop poverty when we



Can you change the world

Opinion card

Helping others make you feel	
	

Appendix D- Reflective Journal

Introduction

The thoughts that filled my mind and shaped my understanding and practice have been jotted in this journal. My thoughts, challenges and triumphs have been chronicled in this journal. This journal also serves as a data collection source and as such its content will be analyzed along the qualitative tradition. This journal has been organized in the following manner: Pre-implementation of unit and the actual implementation. The sentences that have been used as extracts have been underlined. Additionally, some of the codes have been hand written on this document.

Pre-implementation

Design thinking approach seems like a Hail Mary approach to teaching children the art of thinking innovatively. Some questions filled my mind as I constructed this research teaching unit. One such question-was I being true to the tenets of design thinking and my students? I am concerned because I was never formally trained in the implementation of a design thinking unit. I followed along training sessions from the website on <http://dschool.stanford.edu/dgift/#crash-course-video> I cannot determine if it has been fear or reality but I am just realizing that I am about to implement an approach I only read about. I must be crazy my entire Masters and future is resting on something I have read about. Let us hope that this attempt comes out better than my attempts of cooking from direction in a cookbook.

My other concern rest in the actual construction of the unit. Was I being true to the core content of PCR? At first blush this research unit does not seem to directly touch on the content to be covered in any of the core subjects? However, in the Visual and Performing arts (VAPA), Citizenship Character and Values Education, Literacy domains (creative writing, grammar and

much more) structure I have found some connection. Some of the content will be touched from those areas. Should I have used some other topic to investigate that would draw from more subjective areas?

After weeks of trying to construct this entire design thinking approach and PCR unit the time for implementation is at hand. Every theory and concept relevant to this unit has been placed in its construction. All my resources are ready my Samsung note, story pictures, book, camera, flip chart paper and the like are ready. Thanks to the Lord, I own the technology based resources because the school has some available resources that I don't have access too. My Samsung touch screen is the only available technology visual platform that I have access to. My children and I have grown accustomed to using it class. I have used it to show videos of Social Studies, Mathematics and Science. The school was given a massive stereo system, 52 inch smart television and three projects but no computers or internet. For example I want to include sessions where the children will use internet search session to gather information independently but we don't have the technology at school. Nonetheless, we teachers can only use the television and stereo but we do not always have access to the room in which it is kept. The other items are to be used by the continuous assessment component (CAC) teachers. After a year no CAC teacher has asked to use any of the technological resources.

Now that I am visualizing how the first activity should occur some expectations and concerns are beginning to surface. I expect the children to be as talkative as ever, open to drawing, colouring yet shallow in their responses. On the other hand, I am concerned about my questioning skills. I know that I will have to probe these children because they will ask shallow or unrelated questions. I am considering writing some questions before hand but I opted not to write any question. I have to allow the children's interest to emerge and lead the conversation.

Even though I will not write out the questions I do think that question shells will be helpful but writing question shells seems so novice and vacuous, but I did write question shells anyway.

March 16th Activity 1

What an experience! I was concerned about shallow questions but what a shock I received, my students were able to take the issues apart without me really. I felt like a friendly scarecrow being blown by a wind storm of questions from children. The children questioned each other and questioned many of the shallow responses from their peers. I was not given an opportunity to speak. I was happy during the activity. I saw some of my children in a new light. This made me question my and expectations and concerns. In my pre-implementation reflection I identified my questioning skills and my children's seeming lack of depth of thought as a source of concern. I am now thinking that I did not know or trust my students. I also realized that embedded in my concern was my fear of shallow responses. I linked shallow responses to shallow thinking. Did I secretly believe that my children are unable to independently and critically think about topics of interest without me telling them or leading the conversation? Doing the activity I was really a facilitator of knowledge and not the giver of knowledge. The children took center stage. I am questioning why this feeling seems so new to me after almost nineteen years in the profession.

Then I got my first conscious 'ah ah' moment of my action research study. I consciously realized that even though I am a preacher of the postmodern philosophy, but when the 'rubber meets the road' I am a postcolonial teacher at heart. During the activity I wanted to control the time spent on each aspect of the activity, for example the questioning, who would respond, and expand on questions but their responses were so quick that I just had to stand and spin in the wind of questions. At times, I felt myself regressing into my postcolonial desires to rule over my

students and conquer their wells in the name of helping them to learn. I am proving Bristol (2012) correct. I have to monitor this behaviour. It is only my first activity and this need to control the class is rearing its head.

Also, the talkative nature of my students was an expectation. To my surprise the talk they engaged in was related to the topic under discussion. Yet I wanted them to stop talking. During the activity I recalled that I was focused on the time. I focused on the time because I knew that they would have lost interest in the activity. As time marched on they still want to continue with the discussions and later their drawings. What I did not factor was their enjoyment. I stopped trying to move them along and just sat and watched them complete their drawings and sentences. I heard meaningful discussion. I saw them helping each other and pointing out errors. I was able to jot some notes.

Yes my students are talkative, now I can use the politically correct phrase and say ‘productively talkative’ but they are also very shy. This is a complaint that the Principal shared with me after the carnival celebrations. She noted that over the years she has observed that during class rehearsals the children are bold and active but when they are placed in front of an audience they lose all that boldness and vitality. When the camera was videotaping the children grew silent and refused to interact. It was also hindered in my mobility and peripheral focus. However, when the audio recorder was used I got lively discussions. Tomorrow I will use the audio recorder instead of the video recorder. It will be interesting to see how the effectiveness of the audio recorder as opposed to the video camera.

I learnt to:

- Trust my student’s ability to thinking critically.
- Listen to the chatter

- Use an audio instead of a video recorder
- Keep my teacher centered ways in check

March 17 Activity 2

This activity was the first official group task students had to undertake. Coming out of the previous activity I learnt to trust that my students will critically take ideas apart, listen to the chatter, use a hidden recorder and remain student centered. During the activity I could not see or hear all the groups at the same time because I only had one recorder.. So I made a decision and selected a group to listen in on as they worked on their sentence. Thankfully, no one noticed the recorder on the table. They actually used the phonetic clues from the self-assessment list, took turns, talked a lot but stayed on topic, and corrected each other. Yet no one got angry or engaged in any physical fights.

As I looked at the sentences they constructed I saw they had grasped many of the previous concepts from PCR literacy domains and the current concepts of poverty. This is truly the one of the better methods of assessments. Learning and assessing by authentically doing is masterful. I saw glimpses of academic self-regulation emerging. Self-regulation is the key to ‘assessment as learning’. I really have to start incorporating more of these strategies more frequently in my regular teaching practices.

In all the glory of this activity I got a real understanding of why time is an issue for me. Today’s activity took the entire day. My 25 minutes stretched from 9:30am to 1:45pm. The next two days will be unique. My Principal will be at a retreat for the next two days. Even though I had known about her absence I expected the day to function as normal. I never noticed how many disruption occurred during the days she is absent or even present. Here is a snapshot of how the day flowed:

Time	Activity
9:21	Start-Introduction of activity
9:24	Cleaner Concern (disruption)
9:30	Phone call-Had to go to the office to address a matter (disruption)
9:33	Review the introduction start the activity procedure
9:35	Teacher concern (disruption)
9:40	Returned to children
10:05	Another teacher concern(disruption)
10:15	I returned to the class and sent children for their morning break
10:35	Break was longer than usually because a Ministry of Education visitor came to the school, so I had to attend to matters. (disruption)
10:45	I restarted the entire activity

This day was indeed a unique one. I never really noticed the drama involved in teaching in this school. When the principal is present she often complains that all she can write is the data and subject on the board. Usually, the principal may call me away from my class or come to the class to discuss matters but never this many disruptions. Today was indeed an anomaly. I never really noticed the impact of being a Senior Teacher on my time and practice before now. As a Teacher/

Administrator in ECCE I never had the direct responsibility for a group children. As such, I didn't have the responsibility of this direct teacher related activity-planning a specific activities, observing and recording observation of students in groups. So, if I was called away my absence will be quickly compensated by a teacher. In the primary system this type of support is non-existent. I have realized that subconsciously I have been racing to complete task. This must have been impacting on my effectiveness as a teacher.

What I found amazing about this very crazy day is that the children did not lose interest in the topic or activity. In all the madness, I was able to identify groups that functioned well. Three very disruptive children wanted to work together. They are weak in the literacy areas and are the most aggressive in the entire class. I documented how they selected their scribe of the group. These children worked so well together. I pretended to be preparing books near to the group so I heard and saw them at work. They helped each other to phonetically build words, located sight words in the class and settled disagreements without engaging in fighting. This group provided me with the most information about the power of classroom collaboration and cooperation. I must admit that I did not want these children to work together. They can be very disruptive. I wanted to observe how the other children would have dealt with the conflict they would have created. Also, I wanted to observe some peer coaching. I was amazed. They encouraged and helped each other without using any negativity. Firstly, no child wanted to be the scribe, they looked at each other and selected Harry (not his real name) the other two children said we will help you to spell the words. The postcolonial in me want to select Harry to be the scribe because he is academically the strongest in the group but I bit my tongue. This told me that they know their own strengths and that of their peers. Harry agreed and the work continued.

The children seemed to feel safe with each other. They did tear their paper but I did not make an issue of it and they continued working. This group was the first to finish and I drew everyone's attention to them as I gave them a prize. This action made Sheldon, Connie and Harry's faces beam. Later when I listened to the other groups on the hidden recorder I questioned bring the element of competition into the activity because I heard a group member say "yuh see, dem go get a prizes...we will get none." I wondered how giving a prize impacted on the group's collaboration but it did not seem to have much of an impact. In fact, the inclusion of competition seemed to motivate most members of this particular group because previously silent children began to contribute in order to speed the process so they can receive a prize.

At the end of the session I selected a student to speak on behalf of their group. In reflection, I should have allowed them to select their own presenters. The children I selected spoke boldly and was able to articulate the ideas of their group. So far, the comments from the other groups were "that is nice". I must admit that I found it very disappointing that the groups are all just agreeing with each other. May be it will take some time before they feel safe enough to present differing points of view. This study is truly a reeducation for me. Coming out of this activity I learnt the following:

- The power of collaboration
- I need to be patient and not to expect too much too soon

March 18 Activity 3

This activity will let me know if dividing the first component of the design thinking approach model was correct. Would the children be able to depict the issues in poverty? I was fearful that my answer would be no. However, once again these children have shown me that they are very capable even though I think that they are not. Thankfully the disruptions were not

as terrible as yesterday but they did impact the activity. This activity however lasted very long. Firstly, I had a poor student turnout at school today. There was a water problem in the community, and as such, some students were kept at home. For some reason I never considered students absence as a limitation of the study but classroom action research generally require your students presences. So, after I dealt with the cleaners and ensured that all the teachers were settled. Then I discovered that almost half of the research participants were absent. I considered not doing the activity but I knew time was against me, so I pressed ahead. We began the activities, had the discussions and proceeded to the main activity- the dramatic presentations. I placed the children in groups and gave the instructions. I was amazed! (I think that I am using this word to often). The children represented their absent peers well. During the evaluation all groups echoed 'it was nice' and 'it make me laugh'. One of my deepest and most thought provoking reflection occurred at City Gate transit hub, these are my jottings:

'As I sat in City Gate waiting on transport the pride that filled my thoughts turned to shame. I need to remove the word 'teach' from my vocation title. I need to redo this activity. Firstly, too many children were absent, therefore in order to get a true reflection of the children's knowledge I need to redo this activity. Secondly, I sat for almost a month planning this unit and activity and at no point in time did it dawn on this 'post-modern' teacher that I am suffocating these children's creativity. What would have happened if I had open the activity to allow them to select their medium of representing (sing a song, dance or poem) their knowledge? This is another example of my postcolonial thinking. This is me believing that I can teach them everything and direct how they should share what they have learnt. Why didn't I think or consider opening the activity?

This reflection represents my thoughts about the day's activity. While I was waiting at City Gate for transport I began to think seriously about my teacher centered behaviours. I need to examine closely the impact of post-colonial traditions on my practice. So I am going to be true to my study and I am going to redo the activity 3 and include an open dimension to the activity.

March 19 Activity 3 and 4 reloaded

I was excited about the start of this activity because today will be the first day I will attempt to do two activities in one day. Also I was considering yesterday's session as a dry run. So today I was equipped with all my post-modernist ideas. This post-colonial at heart has been transformed. Well two groups repeated what they did on the previous day. They portrayed a man begging without receiving any help from persons passing him by in the street and he dies because no one helped him. These two were the class favourites. These children captured an image from the video they saw in activity 2 but with a 'Trini' favour. While the other two groups sang. Group one did Olatunji's Groovey Soca winning song for 2015 'Ola' and the other group did a calypso titled 'The Poor'. When I heard Ola I waited in the hope that something about poverty would be mentioned but my wait was in vein. So, I just reminded them of the criteria. I remember at the time I hid my true feelings because I knew they took a risk and risk taking must be encouraged. Nonetheless, my post-colonial 'Id' had to be suppressed with a pleasant smile. Since I cannot use unparliamentarily language in my journal I will say I was 'rather displeased with the Ola piece.' In retrospect, I should have asked the entire class to help the group change the words around to make a 'Ola' about poverty. May be something like 'Ola Ola we can help the poor....' may be if I was a post-modern teacher I would have done that instead of just ushering them to their seats. The other group made me proud. They did a calypso that covered all the indicators of poverty that we discussed.

In fact, doing this activity as a lead into the ideation session worked better than I expected. It seemed like a natural fix. The next unit I am doing will be structured this way. As the discussion and solution phase began the children generated many ideas but their ideas were around giving money to Jack's mother or they said "let her look for a job" was a popular sentiment. In order to open their imagination I had to narrow the scenario somewhat. Firstly, I focused on food production for independence and using effectively the extra land space in the picture to grow food. I asked the children to think about machines that can help Jack's mother as she worked on the farm. They got excited and said "something like transformers" (a popular movie). I agreed and the discussion changed.

In retrospect, at the beginning of the Ideation session I was not speaking their language. I became the friendly scarecrow from activity 1 where I was just spinning, pointing and writing ideas. When I sent the students to draw and graphically represent their ideas. They were excited and bursting with ideas. I had arranged the classroom into single desk but some children asked to sit in groups and I agreed. Another City Gate Reflection

Sitting here in City Gate has once again created an occasion for reflection.

Checking my notes I am realizing that four students could have explained what they drew. The rest just engaged in blind group think or drew whatever they saw their peers drawing regardless of relevance to topic. I felt like a failure because most of my children did not seem to have any grand ideas on paper. I was angry with myself for allowing them to work in groups to do their drawings because there are some strong personalities who dominated the group. They all just did the same tractor. I have to stop taking the activities / lessons outcomes so personal. I felt that I should redo this activity. And in redoing this activity I will place the

children in individual seats to avoid the corruption of group think and narrow the instructions even further. As I am sitting here thinking the word **AXIOLOGY** popped into my consciousness. Would I be minimizing my bias? How transparent would that action be? Would I be trying to change the outcome of the study? Was I trying to ensure that their work was perfectly tailored? Was I taking this study to personally? May be I am too close to it to be objective? Or am I so post-colonial that the ideas generated by the students must be in keeping with my ideas about 'creative destruction' as defined by Schumpeter? Thank the Lord my bus is here!

As I review my City Gate reflection I realized that I did not think about keeping my own bias in check. So tomorrow I will review the drawings again before I act.

Lesson learnt

- Respect the research process-let the chips fall where they may

March 20 Activities 5 and 6

I started this day slowly. The Principal was schedule to be away from school today and another teacher indicated that they will be absence for the morning session and should hopefully be present for the afternoon session. So I knew my time would be a precious commodity. Two of the four children with clear plans from activity four came to school. So I gathered the materials they requested and set them to make their prototypes. I asked the other children if they wanted to make their drawings (prototypes) but they showed no interest in making their prototypes. To my great surprise these two children attacked their prototype. I saw the skills in which design thinking proponent expounded about. They tested their prototypes for their friends immediately after making it. Other children came to assist them and they followed the directions of these

young designers. One child's prototype took almost the entire day. She saw to every details in her drawing. I had to stop her in order for her to have lunch. She was motivated. She knew exactly what she was doing, various children came to assist her and she gave them directions and rejected those children who were not following her directions. She worked with assistance from various classes, infants 1 and 2, standard 1 and 2 children. By 1:00pm when she finished and she was alone. Then she explained how it would work. I am not show how to define it. It is a college, all the parts were stick together with glue. She uses paper, scotch tape, and portugal skin. When she asked for portugal skin I asked and she explained "Ms. that is de dirt."

After school I sat looking at what they did. These ideas are real. I wanted all of my children to automatically start 'creatively destroying' when they have been thought to follow the mandates of their teacher. These two children were different. They displayed qualities I never knew they had. Guilt filled me because for more than a quarters of the participants have been their only teacher. So if I found that they were not innovative I had no one to blame but myself. This researcher is beginning to walk the very thin line between professional depression and ecstasy.

Appendix E- Sample of students work

These are pictures of the groups working on their group poster

