WESTPORT BOARD OF EDUCATION

*<u>AGENDA</u>

(Agenda Subject to Modification in Accordance with Law)

PUBLIC CALL TO ORDER:
6:30 p.m., Staples High School, Room 333, Pupil Services Conference Room

ANTICIPATED EXECUTIVE SESSION: Interview of Finalist for Staples High School
Principal; Strategies for Negotiations

RESUME PUBLIC SESSION

PLEDGE OF ALLEGIANCE: Staples High School, Cafeteria B (Room 301), 7:30 p.m.

ANNOUNCEMENTS FROM BOARD AND ADMINISTRATION

MINUTES: February 29, 2016

PUBLIC QUESTIONS/COMMENTS ON NON-AGENDA ITEMS   (15 MINUTES)

DISCUSSION/ACTION:

1. Appointment of Principal, Staples High School   Dr. Landon

PRESENTATION:

1. A Comparative Study of Staples High School and a High   (Encl.)   Dr. Sawch
   Performing High School in Singapore

DISCUSSION/ACTION:

1. Proposed Reductions to 2016-17 Proposed Budget of the   (Encl.)   Dr. Landon
                                          Board of Education   Mr. Longo

2. Student and Faculty Calendar: 2017-18 School Year   (Encl.)   Dr. Landon

ADJOURNMENT

*A 2/3 vote is required to go to executive session, to add a topic to the agenda of a regular meeting, or to start a new topic after 10:30 p.m.
The meeting can also be viewed on cable TV on channel 78; Frontier TV channel 99 and by video stream @www.westport.k12.ct.us

<u>PUBLIC PARTICIPATION WELCOME USING THE FOLLOWING GUIDELINES:</u>

- Comment on non-agenda topics will occur during the first 15 minutes *except* when staff or guest presentations are scheduled.
- Board will not engage in dialogue on non-agenda items.
- Public may speak as agenda topics come up for discussion or information.
- Speakers on non-agenda items are limited to 2 minutes each, except by prior arrangement with chair.
- Speakers on agenda items are limited to 3 minutes each, except by prior arrangement with chair.
- Speakers must give name and use microphone.
- Responses to questions may be deferred if answers not immediately available.
- Public comment is normally not invited for topics listed for action after having been publicly discussed at one or more meetings.

Education for Twenty-first Century Global Capacities:
A Comparative Case-study of Two Schools in
Singapore and the United States

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Acknowledgements

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Contents

Section I. Three Approaches to Conceptualizing
a 21st Century Global Education Framework

1.1 The Context

All over the world, governments and policymakers continue to proclaim the need to educate students for the 21st century. When United States president Barack Obama launched the "Race to the top" competitive grant to spur education reform nationwide, he explained its impetus to "prepare every child, everywhere in America, for the challenges of the 21st century" (cited in Department of Education, 2014, para. 1). In Germany too, the country's poor performance on the Programme for International Student Assessment (PISA) in 2009 led to largescale reforms that benchmarked national curriculum standards against international standards so that their students would be equipped with high level skillsets to compete in the 21st century global economy (OECD, 2010). In Singapore, the Ministry of Education (MOE) (2010) advocated the infusion of 21st century competencies in curriculum and teaching based on the need "to better prepare students for the future economy and society" (para. 2).

Given the significance of such future-oriented policy slogans in propelling education reform coupled with the fact that these may mask ideological agendas, it is vital to ask what the term "21st century education" means. To understand what this entails necessitates examining the fundamental characteristic of our century – the intensification of globalization. Today, the realities of increasingly borderless and networked societies (Castells, 2004), the porous exchanges of knowledge, capital, and products (Scholte, 2005; Spivak, 2003), as well as the permeation of global risks such as terrorism and climate change in everyday local realities (Beck, 2007), have resulted in a transplanetary connectivity (Appadurai, 1996; Friedman, 1999; Luke & Luke, 2000). Consequently, this has contributed to significant interest by educators and policymakers concerning how best to prepare students to engage actively in an increasingly interconnected world.

Thus, we argue that the impetus for 21st century education should be more accurately termed, 21st century global education which refers to education that seeks to equip students with the knowledge, skills, and sensitivities to compete and navigate the challenges caused by globalization in the 21st century. Based on this initial definition, we can then ask, what characterizes 21st century global education? More importantly, what philosophical and theoretical paradigms inform the conceptualization and enactment of 21st century global education in schools?

1.2 Model 1: Human Capital Theory (HCT) and its Infiltration in 21st Century Global Education Discourse

In a review of current frameworks and policies propagated by transnational organizations such as the Organisation for Economic Co-operation and Development (OECD) as well as those emerging from the United States and Singapore, the main concern is that 21st century global education is primarily focused on one aspect of globalization, namely, economic globalization to

the exclusion of political and ethical dimensions of globalization. More significantly, education policies that respond to the imperatives of economic globalization are predominantly informed by Human Capital Theory (HCT) as a result of the pressures of a neoliberal climate. There are three resulting consequences.

The first is the economization of 21st century global education (Spring, 2015) by which is meant that economic reasoning is used to justify policy initiatives and reform. Because HCT is grounded on neoclassical economic theory that perceives education as primarily as an investment in man resulting in positive outcomes in relation to income and economic growth, it has been used to justify continual investments in education and training (Becker, 1962; Schultz, 1960). At the same time, increasing competitiveness among nations in the global marketplace has meant that a decline in a nation's productivity tends to result in education reform initiatives targeted at the development of a skilled labour force to power the economy. For example, in the United States, various scholars have argued that education policy in recent decades has largely been shaped by economic agendas (Keating et al., 2007; Scott & Cogan, 2008; Tye, 2009). In particular, the National Commission on Excellence in Education's (1983) report *A Nation at Risk* have warned about the looming threat of American mediocrity in the world because schools are not meeting the needs of a more competitive workforce. The interpretation of globalization on economic terms have been echoed in reports by the National Governor's Association (1989) and Bill Clinton's (2000) "Memorandum on International Education Policy" that emphasize the importance of international education in preserving the country's global leadership and competitiveness. The justification of standards-based reform premised on the need to respond to the pressures of economic globalization are also evidenced in various initiatives such as the America 2000 Excellence in Education Act, the Goals 2000 Educate America Act, and the No Child Left Behind Act of 2001, seen as the culmination of the federal government's neoliberal approach to education (Keating et al., 2007; Scott & Cogan, 2008).

Similarly in Singapore, education policy has been directed towards the upgrading of human capital to meet the economic exigencies of globalization (Gopinathan, 2007). 1997 is widely seen as the year in which Singapore education reform began to address the phenomena of globalization through the launch of three separate but closely related initiatives –Thinking Schools, Leaning Nation (or, TSLN), The Masterplan for Information Technology in Education, and National Education (MOE, 1997a; MOE, 1997b). The vision behind the former two initiatives directly address the perceived economic needs of globalization as observed when former Prime Minister Goh Chok Tong (1997) launched TSLN beginning with a description of "an intensely global future, with diminishing barriers to the flow of goods, services and information" (para. 3-5). In justifying TSLN, discourses of economic crisis and national vulnerability are mobilised resulting in education initiatives becoming tied to addressing the pressures of economic globalization as well as naturalizing its implicit neoliberal ideology (Koh, 2013).

The economization of 21st century global education, as observed in the influence of HCT in legitimizing education reform, reinforces economic utilitarianism in which individuals are

developed in service of national economic and human resource goals. The second consequence is that this focus on developing human capital is translated into an emphasis on the means through which individuals can optimize their productive value. More specifically, the focus on means leads to the prioritization of teaching of visible, measurable skills and competencies in educational aims and outcomes. Often, the skills and competencies are closely aligned with that required in the global marketplace and increasingly businesses are becoming influential in advocating for their incorporation into teaching (Kilpatrick, 2010). For example, OECD's Definition and Selection of Competencies (DeSeCo) project and its later version specifies core competencies with the rationale that "today's labour force has to be equipped with the set of skills and competencies which are suited to the knowledge economies" (Ananiadou & Claro, 2009, p. 5). These competencies are similar to that propagated by Partnership for 21st Century Learning (P21) which was founded in 2002 involving the United States Department of Education as well as multinational corporations such as Apple Computer, Microsoft Corporation, Time Warner Foundation etc. Both OECD's DeSeCo project and the P21 framework have been influential in spreading the race to educate students for the 21st century around the world as observed in that these were among the frameworks surveyed when the MOE developed their 21st Century Competencies framework. The transnational cross-borrowing of 21st century terminology illustrates the global corporatization of education as corporate culture establishes the business of education (Spring, 2015).

Not surprisingly, the third consequence of 21st century global education grounded on HCT is its nation and corporation-centric focus. Ultimately, the individual is developed in so far as he contributes productively to the nation or corporation (Tan, 2014). For example, P21 (2013) explains that students need to be equipped with relevant skills because "successful businesses are looking for employees who can adapt to changing needs, juggle multiple responsibilities and routinely make decisions on their own" (p. 6). Various scholars have highlighted the dominant emphasis on national competitiveness and security dominating practices of global education in schools in the United States trumping more cosmopolitan openness to marginal cultures (Myers, 2010; Tye, 2009; Merryfield & Kasai, 2010). For example, critical thinking, a common 21st century competency, is often taught in decontextualized ways in the form of instrumentalized problem-solving skills that are paradoxically acritical towards prevailing systems and discourses (Koh, 2004; Lim, 2013).

1.3 Model 2: Human Capabilities Approach (HCA) as an Alternative to 21st Century Global Education

Having outlined three main consequences of 21st century global education conceptualized via HCT, namely its philosophy informed by economic utilitarianism, its outcomes emphasizing means in terms of skills and competencies, and its aims that are nation and corporation centric, the study seeks to explore alternative conceptions of 21st century global education – Human Capabilities Approach (HCA) and Cosmopolitan Capacities Approach (CCA). The differences among the three approaches are summarized in Table 1.

Table 1. Comparing HCT, HCA and CCA

Theories in relation to education	Human Capital Theory (HCT)	Human Capabilities Approach (HCA)	Cosmopolitan Capacities Approach (CCA)
Educational Philosophy	Economic utilitarianism centred on human productivity	Ethical individualism centred on human well-being	Ethical cosmopolitanism centred on engagement and responsibility
Educational Outcomes	Attentions to means (Functionings – Competencies, skills, activities)	Attention to ends (Capabilities involving opportunity, freedom & agency to support human flourishing)	Attention to ends (Capacities to perceive, understand, connect, and empathize with others)
Educational Aims	Nation and corporation-centric	I-centric	Other-centric

In recent years, the Human Capabilities Approach (HCA) has emerged as a powerful theoretical model to contend with HCT's perpetuation of economic imperialism in areas such as education. HCA is based primarily on the work of economist Amartya Sen that emerged in the 1980s and more recently by the American philosopher, Martha Nussbaum. Its intellectual lineage, however, is connected to the ideas of Aristotle, Adam Smith, and Karl Marx and is premised on the essential argument that a country's success should not be measured in terms of economic growth as indicated by GDP and other measures but in the way it supports the development of human well-being (Nussbaum, 2011). The development of the capabilities approach's application to education only begun in earnest a little over a decade ago, with much of the literature being concerned with exploring the approach's philosophical implications or refining it as a theoretical framework (Unterhalter, 2009). In relation to education, HCA emphasizes the importance of the intrinsic goods of education (as opposed to its mere instrumental utility) and aims to provide policymakers and educators with a more holistic approach to education.

In terms of educational philosophy, HCA challenges HCT's assumption that economic well-being would lead to human well-being which presents a reductive vision of complex human living and an inaccurate vision of "on-the-ground" economics and inequalities experienced in today's globalized world (Walker, 2012). For example, the approach fails to explain why people with the same amounts of human capital may face unequal employment opportunities whilst also noting that the approach creates inequalities under globalizing conditions by advancing a "global war for talent" or a new global meritocracy where the brightest and the best, a cosmopolitan elite, can pick and choose jobs internationally (Walker, 2012). Conversely, HCA argues that the development of human well-being is deemed the highest end which individuals should seek to attain and which government and public policies should be directed towards. HCA's philosophical premises are thus grounded on the recognition that human well-being ought not be measured in terms of material resources, but in terms of a people's real opportunities to do and be what they have reason to value (Robeyns, 2006a; Sen, 2005).

In terms of educational outcomes, HCA draws attention to the ends of education centred on the development of capabilities to support human flourishing. More specifically, HCA argues that these capabilities are dependent on three central provisions – opportunities for individuals to pursue what they value, freedom to choose among the opportunities given, and agency to construct one's goals and values. HCA usefully makes a distinction between functionings (referring to competencies and skills) and capabilities. The former are visible, measurable, and can be specifically tied to employment and growth projections. Yet, Sen (2008) warns that over-attention to these functionings may discount real opportunities given to individuals that empower them to develop fully. Perhaps one key advantage of the HCA approach is that it does not discount the importance of instrumental skills and competencies in education but perceives that training in instrumental competencies and skills need to be balanced with more intrinsic ends since "education plays a role not only in accumulating human capital but also in broadening human capability" (Saito, 2003, p. 24). Thus, one distinctive advantage of HCA is that it provides the philosophical ground for a holistic account of education's intrinsic and instrumental value for individuals, one that also takes into account the economic function espoused by the human capital approach:

> [....] The richest model and one most appropriate to an expansive understanding and practice of education ... is a model based on human capabilities which asks what people are actually able to be and to do, rather than only what resources they have. This model captures the significance of human capital and embeds it in the approach but unlike human capital prioritises human beings as ends in themselves, always asking what growth is for and, how does education reduce injustice? It manages to be a much more fertile 'both-and' model of education policy, which leads us into asking better questions of public policy with regard to capability formation. (Walker, 2012, p. 390)

Walker (2012) further asserts that the theoretical framework and concepts of the capabilities approach will address the shortfalls of the capital model and enhance education so that it is "expansive rather than reductive, political rather than technical, human well-being led rather than market-led, transformative rather than adaptive" (p. 390). It provides the philosophical ground that would allow educators, policymakers, and students to overcome a narrow and instrumental valuing of education that is predominant in neoliberal approaches to education for globalisation and twenty-first century society (p. 391).

In terms of educational aims, HCA emphasizes a form of ethical individualism by placing the individual at the centre of human well-being development. It essentially asks whether a person is able to do things he or she would value doing and whether he or she possesses the means to pursue them (Sen, 2005). By asking, "what is each person able to do and to be," HCA highlights both the functionings (competencies and skills) need to be developed in a person but this must also be supported by the freedoms and opportunities created from the political, social and economic environment (Nussbaum, 2011).

1.4 Model 3: Cosmopolitan Capacities Approach as an Extension of HCA's Conception of 21st Century Global Education

HCA provides a powerful alternative to HCT and shares strong alignment with the scholarship on cosmopolitanism that has grown in popularity since the late 20th century as evidenced in the wealth of scholarship in fields ranging from anthropology to international relations, philosophy and literary studies. Key philosophers who have contributed to cosmopolitan theory range from Socrates and Confucius to the German philosopher Immanuel Kant as well as late 20th century philosophers Jacques Derrida and Emanuel Levinas. The main overlaps between HCA and the Cosmopolitan Capacities Approach (CCA) are first, the emphasis on values and capacities required for democratic participation and autonomous living which has its roots in political liberalism (Nussbaum, 2011) and second, the stress on the ethical dimension in addressing key challenges facing the 21st century. Given these overlaps, the Cosmopolitan Capacities Approach (CCA) seeks to extend rather than counter HCA's conception of education. It does so by shifting HCA's ethical individualism inherent in the concept of human well-being (Otto & Ziegler, 2006; Walker, 2005) to encompass a stronger other-oriented philosophy.

In terms of educational philosophy then, CCA is premised on the philosophy of ethical cosmopolitanism entailing questions about what it means to equip students as cosmopolitans, which, translated from the Greek refers to *citizens of the world*. By foregrounding "ethics as first philosophy" (Levinas, 1989), it highlights more succinctly, the point that the end of education is not merely the development of the individual's well-being, but this itself should be seen as a means to a more ethical end involving engagement and responsibility towards multiple others in the world. Such an aim is particularly crucial given the global interconnectedness of the world and the "cosmopolitization" of everyday reality (Beck, 2007) in which global issues such as climate change and terrorism now permeate the local. Consequently, there is a need for individuals to perceive themselves as "rooted cosmopolitans" (Appiah, 1998) who are tied to their home and communities but share an affinity with other communities in the world. The idea of multiple and flexible forms citizenship and belonging (Cheah & Robbins, 1998; Ong, 1999) is what enables one to acquire a "planetary lens" (Spivak, 2003) to recognize oneself as part of the human fraternity and it then enables one to connect with the concerns of others particularly marginalized and discriminated communities in the world.

In terms of educational outcomes, CCA perceives that capabilities should not merely foster an individual's well-being but that in doing so, the individual is then empowered to use his or her knowledge and skills to empower others. Thus, CCA focuses on the ends of cultivating capacities which denotes the ability or power to perceive, understand, empathize with and defend or find solutions to addressing the concerns of others. The notion of capacities captures the range of scholarship on cosmopolitanism that describe it as an orientation demonstrated by a willingness to understand the other (Hannerz, 1990); a human connection to the other not based on identity but despite differences (Appiah, 1998); a sensitivity towards the plight of others that

enables one to accommodate multiple perspectives (Beck, 2006); and an active response to defending the rights of marginalized others affected by global injustice (Robbins, 2012).

Finally, in relation to educational focus, CCA counters HCT's nation and corporation-centric focus as well as HCA's I-centric emphasis. CCA recognizes that the individual's well-being is significant since this is a precondition to engagement with others. However, its other-centric orientation pushes for an education that is inclusive of multiple perspectives involving the histories, traditions and ideas from diverse cultures and traditions in the world. It also seeks to develop world citizens who are active agents in demonstrating what Bruce Robbins (2012) terms, "new, dirty cosmopolitanism" which is the intentional engagement with realworld instances of global injustice particularly towards stereotyped and marginalized communities in the world.

1.5 Theoretical Framework

While HCA addresses several limitations to HCT, its focus on the development of human well-being could be extended further to foreground ethical engagement and responsibility to others. In this light, CCA's ethical cosmopolitan ethos can be used to conceptualize a more holistic and ethical 21st century global education framework. Such a framework would take two main elements.

First, it would recognize the importance of functionings (competencies and skills) as well as capabilities (opportunities, freedom and agency to pursue valued functionings). However, as an aspirational, envisioning framework, it would describe how these should lead to the development of ethical capacities related to the capacities to perceive, understand, empathize with and defend or find solutions to addressing the concerns of others.

Second, such a framework should recognize that functionings, capabilities and capacities occur in different domains of action. Adapting Habermas's Communicative Action theory (1984), there are essentially three differentiated and overlapping domains of action that privilege different ways of thinking, acting and speaking in the world. In the critical (cognitive) domain, one engages critically, logically and through reasoning, making claims to objective truth; in the creative (aesthetic/affective) domain, one engages one's sensitivity and perceptual intuition providing affective, generative and innovative responses; in the communicative (social-moral) domain, one engages social relations through means of communication to influence, understand or connect with others (Choo, 2014; Harrington, 2000). See Figure 1, pg 11 for an overview of key domains in a Cosmopolitan Capacities Framework to 21st Century Global Education.

Figure 1. Overview of key domains in a Cosmopolitan Capacities Framework to 21st Century Global Education.

Ends: Capacities
This refers to the capacity to perceive, understand, empathize with and defend or find solutions to addressing the concerns of others through the employment of functionings and capabilities.

Ends: Capabilities
These are opportunities, freedom, agency for the development of human well-being through the employment of functionings.

Means: Functionings
These involve competencies, skills and activities deemed valuable for an organization. Note: Functionings are defined based on organizational needs. The following are examples.

Critical	Creative	Communicative
(Example: problem-solving, critical reasoning, analysis, synthesis and evaluation)	(Example: improvising, appropriating, envisioning, imagining)	(Example: communicating, navigating, collaborating, engaging.)

Source: Choo, S. S. (2015). Envisioning 21st Century Education through a Cosmopolitan Capacities Approach. Singapore: National Institute of Education.

Section II. Research Methodology and Overview of Case Study Sites

2.1 The Purpose & Research Questions

In this study, we examine how two schools in Singapore and the United States enact 21st century education as a "school-wide" phenomenon involving the collective and intentional effort by school leaders and teachers to plan and manage the school curriculum. In particular, we examine how global education is imagined and articulated by school leaders, school policy, and teacher accounts as well as how their collective ideas of global education are realized in practice. There are three central research questions.

1. How is global education imagined and articulated by school leaders in both schools?
2. How do teachers in both schools equip students with critical, affective, and communicative capacities to engage with global concerns?
3. In what areas do both schools diverge, converge and interconnect in their articulations of global education and cultivation of capacities to engage with global concerns and why?

2.2 Research Methodology

This study employs a cross-comparative case study methodology. Since case studies "are generalizable to theoretical propositions and not to population or universes" (Yin, 2009, p. 15), the aim of the study is not to provide models of whole-school approaches to global education that are representative of the two countries studied. Rather, the study aims to provide interpretive understandings of a phenomena, in this case how global education is integrated in schools in two different countries.

Data collected for each site includes curriculum documents related to school policies and curriculum; semi-structured interviews of between 19-21 school leaders and teachers; classroom observations of 5 teachers at the upper secondary level teaching the following subjects: English Language, Literature, Science, Mathematics, and Humanities or "Special Projects"; and focus group interviews with 8-10 students from the classes observed. Teachers were selected via convenience sampling methods (Bernard, 2006) based on recommendations by the Principal or Deputy/Assistant Principal of each school.

To address research question 1, interview data collection from both schools were analyzed initially utilizing the text-mining software Leximancer that provides a ground-up approach to identify key concepts in transcripts allowing researchers to follow-up with in-depth analysis of transcripts. These were supplemented by analysis of school policy documents.

To address questions 2 and 3, the study utilized Yin's (2009) framework of cross-case analysis involving first, single analysis of the data collected for each teacher from the two schools. The observations were coded utilizing the Cosmopolitan Capacities Framework (see Figure 1, page 11). The researchers wrote a detailed summary of the findings for each teacher.

Second, cross-case analysis was conducted to examine the areas where both schools diverge, converge and interconnect in their envisioning and infusion of global education.

2.3 Overview of Case Study Sites

The sample sites involve two schools – Highlands High School (HHS) in Singapore and Staples High School (SHS) in the state of Connecticut, United States. Note that pseudonyms are used in place of actual names of teachers and the Singapore school to protect confidentiality.

HHS caters to students from secondary one through junior college (equivalent to grades seven to twelve) with over 4000 students and 400 teachers. The school is an independent school catering to boys from secondary one through four (grades seven to ten) and is co-ed in junior college year one and two (grades eleven and twelve) taking students from other schools as well as its affiliated girls school. The school comprises predominantly Chinese students. The school has 5 deputy Principals, 2 in charge of the secondary school (grades seven to ten), 2 in charge of the junior college (grades eleven and twelve), and 1 to oversee external partnerships. The school has been designated a "future school" by the Ministry of Education denoting schools that implement innovative programmes particularly employing technology across all levels and subjects. It has also been designated an "Integrated Programme" (IP) school in which students do not need to take the highstakes national examination (titled the GCE Ordinary Level examination) at the end of grade ten, which is the case for most mainstream schools in Singapore. Instead, students only need to sit for one highstakes national examination at the end of grade twelve. HHS is a highly reputable independent school catering to the top 5% of students in Singapore who are selected for entry into secondary one based on the results of a highstakes national examination taken at the end of primary school. To date it has produced countless numbers of students obtaining prestigious government and national science scholarships; and virtually all their students go on to leading universities with a strong entry each year to prestigious universities such as Oxford, Cambridge, Harvard, Yale and Stanford. In 2015, *Nature* showcased HHS as having one of the world's "most innovative Science-education programmes".

Like HHS, SHS in the United States has consistently been ranked among the top five best schools in the state of Connecticut and among the best in the United States by Bloomberg-BusinessWeek, Newsweek, US News & World Report and the Wall Street Journal. The school takes in students from grades nine to twelve (equivalent to secondary three through junior college). It was accorded the "National Blue Ribbon award" by the US Department of Education for "achieving superior standards of academic excellence." Average SAT scores rank among the top scores in the state, and students consistently score in the top 5% of the state on state exams in years 4, 8, and 10. According to the Director of Secondary Education, over fifty percent of their students get into either the most highly selective or the second tier of highly selective colleges. School enrolment is approximately 5,700 and the school is located in an affluent suburb with an average household income of $155,000. A majority of students are Caucasians with approximately 9.3% of students identified as students of colour.

To address the question of elitism, this research represents only the initial phase of a broader study that, in the following phase, would expand to include the study of global education in other types of schools particularly those that are less resourced and academically average or below average.

2.4   Selection of Case Study Sites

Both school sites are chosen based on Yin's (2009) notion of a "replication design" (p. 53) which concerns the careful selection of each site so that they share common theoretical characteristics (see also Dooley, 2002; Eisenhardt & Graebner, 2007). The theoretical basis for selection comprises two factors. First, similar to the Ministry of Education in Singapore, the Connecticut State Department of Education (CSDE) is advocating the integration of 21st century skills in schools across the state. Between 2006 and 2011, CSDE launched its five year Comprehensive Plan entitled "A Superior Education for Connecticut's 21st Century Learners" and piloted what it termed "Twenty-first century courses" such as Bio21 offered through The Centre for Twenty-first Century Skills. In 2008, it launched its secondary school reform organized around three concepts including 21st century learning and the committee recommended that 21st century skills must be embedded within all units of study and daily lesson plans. The rationale for this is that "living and competing successfully in a global society and economy will require an understanding of our interconnectedness, collaboration and leadership skills, habits of personal and social responsibility, and adaptability to change" (CSDE, 2008, p. 8). CSDE's push for a whole-school approach to 21st century learning is connected with its goal of preparing students to thrive in a global world. This initiative makes Connecticut one of the few states in the US including Miami (Kirkwood-Tucker, 2009) and Massachusetts (Reville, 2008) to lead in a state-wide push for a whole-school approach to 21st century learning that responds to the need to develop students as active participants in a global world.

Second, the two school sites are selected because both have overtly incorporated a whole-school approach to global education and sought to infuse this into the culture of teaching and learning. SHS was part of a district-wide initiative that brought together school leaders, teachers as well as members of the community to identify the skills and dispositions that students would need in the 21st century. This led to the launch of its 2025 vision titled "Meeting the global challenge" that aimed "to prepare all students to reach their full potential as life-long learners and socially responsible contributors to our global community." The articulation of this vision led to teachers placing more emphasis on developing authentic assessments involving real-world problem-solving, promoting creative and cross-disciplinary thinking. Beyond integrating global perspectives into existing courses, the school designed a course entitled "Global Themes" that was introduced at grade nine built around interdisciplinary issues related to global interconnectiveness, revolutions, imperialism with an emphasis on critical questioning and thinking.

A global ethos is also evident in HHS which aims to equip students "with the skills and insights they need to thrive in this new, global age." The school was the first in Singapore to set

up a satellite campus in China. In 2012, it hosted the inaugural Global Learning Alliance summit bringing school leaders and scholars from all over the world to explore the theme of "World-class Education" and has been hosting prominent international events such as the Asia Pacific Young Leaders Summit. Over the years, the school has established a robust global academy that has fostered connections with over 95 schools in 20 countries. Students are required to participate in overseas immersion programmes of between four to eight weeks and the sense of global awareness is fostered through faculty initiated courses such as Bicultural Studies and Current Affairs.

To concretize global education and implement it as a whole-school approach, both schools engaged scholars from Teachers College, Columbia University, USA (TC) and the National Institute of Education, Singapore (NIE) and customized an existing global capacities framework developed in 2011 by Dr Suzanne Choo (NIE), Dr Deb Sawch (TC), and Dr Alison Villanueva (TC). This was termed "Lens for Examining 21st Century Capacities in Teaching and Learning" in SHS and "Global Literacies Matrix" in HHS. In each school, both frameworks were designed by a core group of teachers spearheaded by the Director of Secondary Education or the Deputy Principal and were subsequently infused in all areas of teaching and learning.

Section III. Findings Part One – Imagining Global Education

This section presents findings to address **Research Question 1: How is global education imagined and articulated by school leaders in both schools?** The findings stem from analysis of interviews, school policy and curriculum documents collected between 2013 to 2014.

To systematically infuse 21st century global education throughout the curriculum, HHS developed the "Global Literacies Matrix" which is a framework detailing 7-8 functionings (competencies and skills) in three domains – critical, creative and caring thinking. The matrix evolved from the school's holistic education model developed in early 2011 utilizing Howard Gardner's Five Minds of the Future – disciplined mind, synthesizing mind, ethical mind, respectful mind, creating mind – with an additional dimension – entrepreneurial mindset – in recognition of the fact that students need to be able to foresee future needs, create and communicate innovative solutions to others. These five minds were synthesized into the three domains of thinking – critical, creative, and caring – that were then used to guide lesson planning.

Likewise, SHS also applied a 21st century Teaching and Learning lens developed by the school district over four stages since 2011. The lens is a concretization of the district's 2025 vision titled "Meeting the global challenge" with its aim stated as follows: "To prepare all students to reach their full potential as life-long learners and socially responsible contributors to our global community."

The following provides an overview of some of the similarities and differences between both schools' articulation of 21st century global education.

3.1 Emphasis on competencies

The frameworks developed by both schools articulate explicitly the key competencies that students need for the 21st century. This provides a useful guide for school leaders as it concretizes their vision statements and provides some concrete measures to ascertain the extent to which the school can achieve this vision. It is useful for teachers as they become more cognizant of diverse skills in multiple domains that they can encourage. It is useful for students and parents as it shifts the focus of education away from exam skills to broader, more holistic skills needed in the future. Table 2 provides a comparison between 21st century competencies frameworks emphasized in HHS and SHS.

Both HHS and SHS emphasize core skills in critical and creative thinking. One difference is that HHS's framework values prediction as a key part of critical thinking. A second difference has to do with the competency of questioning. Questioning is connected to creative thinking for SHS; it is tied to the disposition of curiosity which means following one's interests, one's questions even if this does not lead to a concrete outcome. On the other hand, questioning is tied to critical thinking for HHS which implies that questioning is part of the critical process of reasoning about something and more often tied to an outcome e.g. to interpret or analyze something. A third difference is in relation to creative thinking. HHS has competencies related to

perseverance and foresight which are keys to the creative process and embraces the idea that one can fail numerous times but that it is more important not to give up. In some ways this is implicit in SHS' emphasis on risk-taking and tolerating ambiguity.

Another difference concerns the third domain which HHS terms "caring domain" and SHS terms "Global thinking." Both are similar in the emphasis on ethics and thinking about others, and the ability to look at things from multiple perspectives. However, HHS places emphasis on more competencies that emphasize social-ethical relations with others that relates to empowerment of others, empathy and cultivating social relationships. For SHS, the emphasis appears more related to global citizenship competencies such as engaging in real-world problem solving and global issues.

A final difference is SHS' emphasis on communication which is not mentioned in HHS's framework although it should be noted that the school increasingly stresses the importance of oral communication and aspects of communication are embedded in the caring thinking domain such as reflects and contributes actively.

Table 2. A comparison of key competencies emphasized in 21st century global education frameworks in both schools

Domains	Highlands High School	Staples High School
Critical thinking	• Comprehends • Interprets • Analyzes • Applies • Questions • Predicts • Synthesizes • Evaluates	• Interpreting • Analyzing • Synthesizing and making applications • Evaluating
Creative thinking	• Imagines • Observes holistically • Experiments • Innovates • Thinks with agility • Perseveres • Has foresight	• Questioning and curiosity • Observing and imagining possibilities • Risk taking and tolerating ambiguity • Agility and adaptability
Caring /global thinking	• Reflects • Empowers • Contributes actively • Considers multiple perspectives • Collaborates • Empathizes • Cultivates relationships	• Engaging in real-world problem solving • Engaging in global issues • Engaging in multiple perspectives • Working across disciplines
Communication	NA	• Reflecting and meta-analysis • Considering purpose and varied media to express ideas • Influencing and negotiating to reach goals • Collaborating strategically

3.2   Concretization of vision

Too often, vision and mission statements are articulations of schools' aspirational ideals that are plastered on the walls of schools and printed in school handbooks and websites. Often there is a disconnect between vision and the reality of teaching and learning. What is obvious in both HHS and SHS is the intentional and systematic translation of school vision into concrete frameworks that are infused in teaching and learning.

In HHS, the school's vision is "Defining Holistic Education, and Empowering our students to Live with Passion and Lead with Compassion." Holistic education is encapsulated in the 3Cs – Critical, Creative and Caring thinkers. In 2011, the school identified a new set of strategic priorities in the school and identified "Reading and reasoning" as one of the key strategic priorities. A task force was set up to develop a reading and reasoning initiative for the whole school and this initiative was later expanded into global literacies. As part of its commitment to develop the Global Literacies Matrix, the school formed a task force to develop the global literacies framework. Essentially, the framework details specific competencies in each of the 3Cs. Within each competency, there are also detailed descriptions for three specific levels – The apprentice, the developing student, and the global-ready student. For example in the "Comprehends" competency under critical thinking, the spectrum is as follows:

Figure 2. Example of HHS's competency spectrum – Comprehends

Descriptors	The Apprentice t	The Developing Student	The Global Ready Student
Shows understanding of main ideas	Identifies obvious / basic elements of the core concepts and ideas	Explains understanding of core concepts and ideas.	Able to make connections and generates new knowledge schemas for core concepts and ideas - able to give examples, interpret, predict, rewrite concepts in a novel context /situation (as required).
Perceives intention and significance	Sources for (multimedia) information and is able to identify and list the range of perspectives.	Assesses the situation / environment(multimedia) information and in context and considers, is responsive to new perspectives.	Makes connections of (multimedia) information Draws multi-disciplinary connections. Demonstrates ability between contexts toand apply knowledge in real world situations engages with new perspectives.
Understands multi-media information (digital literacy)	Receives and follows explicit nstruction.	information for the purpose of fulfilling task requirements. Learns and responds in an appropriate way according to the situation.	Internalises and takes initiative to share insights on topic / concern.

In SHS, the framework was part of the district's 2025 vision, as mentioned earlier. In 2010, as part of a private foundation innovation grant and in anticipation of the changing dynamics of a globalized world, SHS was part of a district initiative that sponsored a town-wide

brainstorming session that brought together social workers, business executives, health care workers, artists etc., to identify the skills and dispositions that students would need in the 21st century. The framework describes specific competencies with each competency elaborated across a spectrum leading to the competencies expected of a "global student." For example, in the "questioning and curiosity" competency under creative thinking, the spectrum is as follows:

Figure 3. Example of SHS' competency spectrum – Questioning and Curiosity

Questioning and Curiosity				Global students...
	Ask fact-based questions that show a desire to understand basic content	Ask fact-based questions that show a desire to understand the ideas and concepts in deeper ways	Ask analytical questions that make connections and lead to deeper explorations	Ask new and original questions that lead to deeper explorations
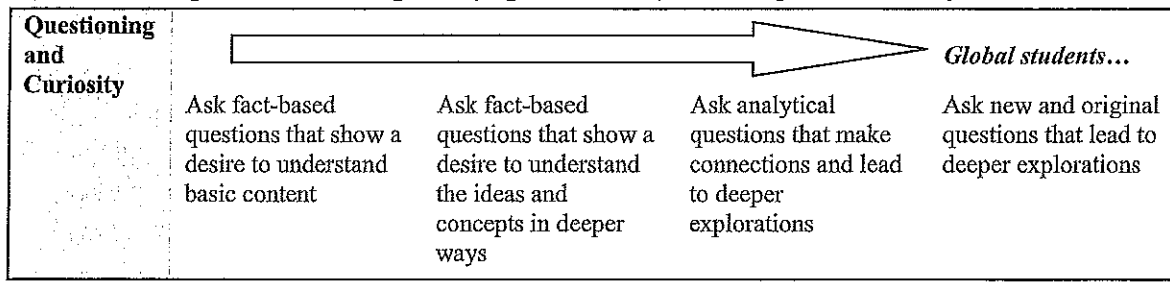
3.3   Ground-up process of developing the framework

In both schools, the development of the framework occurred via a ground-up approach. In HHS, a global literacies task force was set up in 2013 with key leaders identified. The Deputy Principal of the high school oversaw the task force and one faculty was designated the role of senior teacher of global literacies. Time was given every week for the task force to meet and work on designing the framework. The use of the framework was communicated by the task force to key leaders/heads of department. The task force worked with them on identifying important competencies and describing them along with keywords. The heads and subject heads of the department would then share with them how to utilize the matrix in lesson planning during weekly professional sharing sessions. For example, at one science department meeting, one task force member gave the teachers the background of the matrix, its significance to the school mission and then showed them examples of lessons infusing aspects of the matrix. Teachers who designed lessons incorporating specific competencies and skills in the matrix well were also encouraged to share with others at these sessions. The task force members also organized regular coaching sessions with key leaders to demonstrate how to use the matrix and how to affirm teachers through the use of the matrix such as during lesson observations. In one session, task force members themselves sought to show how questions asked in the worksheets and schemes of work can be modified using the matrix. The result was a shift towards higher-order questions. This was later shared with other department teachers.

The groundup approach has worked because task force members share that slowly teachers are becoming more comfortable with using the matrix due to the numerous sharing and coaching sessions. Part of the reason why the framework has been embraced is that it is not used as a tool of evaluation but as a tool of development. Key leaders are encouraged to observe and highlight GLM competencies during their lesson observations. Task force members stress that this is not to assess teachers but to affirm and develop them. This occurs when leaders recognize

the competencies that teachers demonstrate well and encourage them to think about developing other competencies in the course of their lessons.

In SHS, the process of developing a global lens began in 2011 when the Superintendent issued a letter announcing a groundbreaking initiative and inviting teachers to participate in its early stages of development. A task force formed from teachers who volunteered and they then commenced working with scholars from Teachers College, Columbia University to adapt an existing Global Capacities Framework (Choo, Sawch, Villanueva, 2011). The Director of Secondary Education was put in charge of overseeing the development of the framework which was rolled out slowly in stages. To assist her, a steering committee comprising about 15 representative faculty and administrators was formed to give a general idea of the project. The development of the framework was helmed by the task force comprising fifty teachers across the elementary, middle and high schools. Task force members met about six times each year and individual teachers also used the lens to design units and task force members acted as critical friends giving feedback. Additionally, various subcommittees were formed to support the work of the framework such as a subcommittee examining how to support creativity and innovation. About 6 professional development days in the course of the year was organized around the different aspects of the lens and 21st century skills. An early version of the lens was introduced to the first cohort of 6-12 teachers in early 2012. This gradually expanded so that approximately 65 teachers and administrators (representing 15% of the total staff) volunteered to participate in the early stages. By the fourth year, total participation in the initiative reached about 85% as estimated by school leaders.

A key highlight in this area is how SHS' groundup process is encompassing and holistic involving teachers, school leaders as well as students and the broader community. The district started a "community conversation" because they felt that the development of the lens required input from the community. During one of the Saturdays, they invited hundreds of people from the community with different professional backgrounds and small focus groups were formed to get perspectives about how the district can better work towards preparing students for the 21st century. A key outcome from the community conversation was the awareness that students needed an expanded knowledge of worldwide affairs. This resulted in modifications of courses so that a Global Themes course was developed. From these conversations, the district organized an annual Parent University with over 600 parents enrolled in workshops. Through these workshops conducted by teachers and school leaders, parents are introduced to key initiatives and goals of the district such as how the lens is being incorporated into teaching and learning. Parents are then encouraged to participate in helping their children be successful learners for the 21st century.

Another highlight in this area is how SHS also adapted the framework for students at the middle and high school level. A committee of teachers from the high school and middle school was formed to try to translate the lens into a language that students would understand. Using a rough draft they came up with, they introduced the student lens to 20 different classes. The teachers went through the lens with the students and focus groups were formed with students

giving feedback and suggesting revisions. In this way, students became involved in the revised version of the student lens.

3.4 Systematic infusion and soft-sell

To further infuse the framework throughout the school, school leaders and task force members in both schools sought to systematically infuse the language of the lens throughout the whole school. In HHS, teachers are encouraged to incorporate the language of the matrix in their year plan (scheme of work), unit and lesson plans. Some teachers even modify their worksheets making specific competencies and skills explicit. In the matrix, each competency is given a detailed description along with keywords. Teachers are encouraged to use these keywords in their schemes of work and syllabus documents. Additionally, competencies from the matrix are incorporated and highlighted in school programmes.

A key highlight here is how, aside from the systematic infusion, HHS leaders encourage ownership from teachers. Task force members share how in the beginning, they assured teachers that the matrix is not new but that teachers have already been teaching these competencies and skills in the classroom. They explain that the matrix is meant to help teachers become more conscious of the competencies and skills they are teaching. More importantly, it serves to surface and highlight competencies and skills they have been teaching but which may not have been recognized by themselves or their supervisors. It is also used to highlight gaps in teaching competencies and skills that may be under-emphasized. HHS task force members acknowledge that most teachers are now onboard with the matrix though there are a few that remain uncertain and sceptical of its use. They reiterate the importance of not imposing the tool on reluctant teachers but to give them time to buy-into the idea and think of ways to incorporate it into their lessons.

In SHS, the Superintendent reorganized the administration structure so that there is now a Director of Secondary Education and a Director of Elementary Education. Part of their responsibility is to incorporate the lens in curriculum writing as well as instruction. The framework is also made into posters that are made explicitly visible on school buildings and on every wall of classrooms. The language of the lens is also referenced at Board of Education meetings, faculty meetings and departmental meetings. Additionally, the superintendent and vice-superintendent hold regular meetings with the Principals and Assistant Principals, Department chairs and curriculum leaders in the schools to reinforce the importance of incorporating the lens.

3.5 Transformative power of a common language

One of the main effects of the framework has been the transformation of school culture through the spread and infusion of a common language around 21st century competencies. The involvement of different actors in the school in developing the language of the lens has led to greater buy-in and enthusiasm for its use. In both schools, key leaders observe that a common language is emerging in curriculum plans and teachers have begun incorporating keywords

related to each competency in unit and lesson plans as well as worksheets. Teachers have become more aware of higher order type competencies and the language of the matrix facilitates modifications of expectations in lessons such as a change from getting students to "explain" to having them "compare" (a keyword associated with the competency "evaluate" in the HHS's Global Literacies Matrix).

Another effect has been greater awareness about the need for holistic education. In HHS, for example, teachers are more cognizant that they tend to emphasize critical thinking compared to creative and caring forms of thinking. They share that teachers have begun to think of ways to encourage creative and caring thinking, for example, by giving more opportunities and curriculum time for creative and inquiry based projects as well as highlighting projects that have an ethical, humanistic focus. Task force members continually remind teachers about the need for a balance so that all three forms of thinking are emphasized over the course of the year.

Section IV. Findings Part Two – Enacting 21st Century Global Education

Both HHS and SHS have invested considerable time and effort in the development of a 21st century global education framework and have systematically planned to infuse its implementation throughout the whole-school. This section looks at how functionings, capabilities and capacities support 21st century global education via school programmes and instruction. Rather than using the frameworks developed by the schools to interpret the data, this section employs a broader Cosmopolitan Capacities Framework for 21st century global education (Refer to Figure 1, page 11). This section responds to **Research Question 2: How do teachers in both schools equip students with critical, affective, and communicative capacities to engage with global concerns?**

4.1   Functionings (Competencies and Skills)

Communicative Functionings

In HHS, many of the school programmes are catered to fulfilling the school's mission to "nurture leaders in research, industry and government to serve the nation." As such, investment is given to functionings central to leadership development – ability to communicate with others and the critical ability to conduct research.

Equipping students with the ability to communicate occurs at several levels:

- Subject level – Besides core and elective subjects in the curriculum, all students have to take 2 special subjects – Oral Communication and Independent Studies. The grades for these subjects are titled "Scholastic assessment" that is included in the students' report card together with "Academic assessment" (grades for core and elective subjects). To emphasize the importance of speaking well and convincingly, students are trained in oral communication which involves oral participation in class and current affairs in English and Chinese. In the Current Affairs class which occurs for one hour each week, students are encouraged to participate actively by articulating their views on current issues and debating these with others.

- Consortium level – Unlike other mainstream schools, teachers in HHS are not tied to departments but consortiums which may comprise teachers from different subject areas. As the Principal explains, the consortium model was set up 10 years ago to change the mindset of teachers from focusing on their subject area to focusing on students. The purpose of the consortium is to look into the holistic development of students. Every student is thus placed in 1 of 4 consortiums during the first four years of secondary education and within this consortium, they are given opportunities to pilot various projects and initiatives. These are opportunities for them to communicate and collaborate with their peers to organize consortium events and to participate in the student council.

- School level – At the school level, the Principal organizes forums that provide opportunities for students to openly discuss school policy as well as current issues. In one forum for secondary four students held in February 2015, the forum's topic was on freedom of speech and two students began by providing different perspectives for and against freedom of speech. The Principal facilitated the discussion and encouraged other students to contribute their opinions. Not only were students constantly encouraged to voice their opinions, the occasion helped them understand the complexities of the issue and understand it from various perspectives. On other occasions, students have critiqued and raised suggestions to change specific school policies that were then taken into account by school leaders.
- International level – Beyond the school, students are also challenged to learn to communicate with others from different cultures. The school brings in teachers and students from various parts of the world by organizing events such as the Asia Pacific Young Leaders Summit that brings young leaders from over 20 schools in more than 10 countries. Students are also provided many opportunities to participate in immersion and exchange programmes in the United States and other parts of the world. In particular, the school has two satellite campuses in Beijing and Xi An, China and students spend between four to eight weeks in one of these campuses in the course of his secondary education. A key focus of these programmes is to allow students to immerse in the culture of these countries. Students attend classes with the locals, take public transport and interact with the locals in Chinese. One project they have to do is to create a business plan to market a product, and conduct research by interviewing the locals and even convincing them of the seriousness of their plans.

Critical functionings

Aside from communicative functionings, school leaders and teachers also acknowledge the importance placed on critical thinking and in particular, on equipping students to do independent research. HHS has invested in the establishment of a science research centre and laboratories along with tie ups with universities and government research agencies. At the school level, Independent Studies is a second non-academic subject that all students must take in addition to Oral Communication. Students are free to choose a project topic in one of 11 categories and choose their team-mates and teacher mentor. The 11 categories cover a wide range of topics such as science and math, infocomm, languages, arts etc. Time is given for students to work on their projects and meet with their tutors during curriculum time in terms 1 and 2. Students are provided training by teacher mentors on how to design and implement their projects and in April each year, they submit their proposals to a panel comprising teachers who will provide feedback on the feasibility. By August, the best projects are selected and presented in the school's projects competition. Every student receives a grade for their project at the end of the year which is included in their annual report. The significance of Independent Studies allows them to be independent learners, to collaborate with peers and to engage in critical problem-solving. Students may also be mentored by external partners in industries and tertiary

institutions. The Projects Competition serves as a platform for students to take their projects further at international competitions where they have clinched world championships.

Unlike HHS, SHS does not have an Independent Studies programme that runs across all years. However, an almost similar programme is their science research programme which is a 3 year course that students enrol in, typically in grade 10 (equivalent to secondary four). Students volunteer to join the programme and there is no selection criteria. They then work closely with science research teachers to identify an area of science they find interesting and then develop a research question and accomplish that research through those 3 years. A key feature of the programme is that it is student-directed and organic. Before the start of the programme and over the summer break, students are asked to read a series of articles that they choose on a wide range of science topics. In the first few meetings with the teachers, the students select the articles they find interesting and discuss this with their teachers. The students then select the topic of interest and craft research questions around it in consultation with their teachers. Oftentimes, students also make contact with a mentor at a research university. About 100-150 students participate in the programme. Class sizes are small with less than 18 students per class. Students meet during curriculum time and are taught foundational laboratory skills but most of the individualized work and meetings with teachers occurs outside of class time. Typically, students will meet with their teacher twice a month for half an hour and are expected to work on their topic outside of class on their own. A key goal of the programme is for students to present their research in any number of public forums such as the Intel Science Talent Search, the Siemens Competition, the State Science Fair etc.

In SHS, critical functionings is also tied to realworld problem solving. Teachers often connect content to students' daily lives, for example, in Chemistry, students conduct projects on environmental remediation by looking at how ground water becomes contaminated, what are the contaminants, what are ways where those contaminants can be mitigated. The science department also runs a forensics course and at the end of each class, the teacher sets up a crime scene and the students need to evaluate it using all the techniques they've learnt. In some instances, one group takes on the role of the prosecution and the other, the defense so they get multiple perspectives on how to interpret the data. The Principal describes how he wanted to infuse critical thinking, problem-solving, Math and Science in a woodwork course. Students are asked to do things like "learn what a thrust bridge is and why it is as strong as it is and why architects or engineers often use it as a low-cost solution to bridge two ends of a cliff" etc. They are then asked to design a bridge using two ounces of balsa wood, a tube of glue and other materials. In another project, students experiment with using a tin can and other materials to develop a steam engine that can turn a propeller. They have to design three different propellers and measure how much electricity is produced. In culinary class, students similarly have to learn how make various dishes but are given realworld contexts and must think about the case that if they own a restaurant, how much it would cost to make the product, how to make it more nutritious while keeping to the cost and ensuring the business is profitable.

Global-ethical functionings

Closely connected to critical functionings is global-ethical functionings. In HHS, it is important that students are aware of current global issues. Thus, 60% of the Oral Communication grade for all students that is indicated in their report cards is derived from their participation in a Current Affairs programme in English (30%) and in Chinese (30%). The programme is included for one period daily in the curriculum for each level. To further develop an awareness of global issues, the school was among the first to initiate the Bicultural Studies Programme. A group of upper secondary students (grades nine and ten) are selected for this programme and study economics, politics, history and literature of China and the United States.

In SHS, the priority given to this is observed in the introduction of a new subject titled "Global Themes" that all grade nine students (equivalent to secondary three) are required to take. The course started three years ago and the students meet 4 times a week for about 45-50 minutes per class. The course is differentiated into three levels – B level section for students who prefer a slower pace, A level section for mixed ability students and Honours level section for higher ability learners. The course is structured around big overarching questions utilizing a case study approach. Students will examine a historical case study to look at the development of that theme in history and then connect this theme to contemporary issues. The difference between this course and social studies is that it does not take a chronological approach to studying history but a thematic one in which students investigate concepts related to human nature, economics, politics, religion, and the forces in the society. More significantly, the course equips students to be more aware of global issues in the realworld. A prominent pedagogical approach is inquiry. Not only is an inquiry question used to frame each unit, skills such as critical reading and questioning are taught and reinforced. For example, students must demonstrate 3 levels of questioning – the first concerns fundamental questions, the second concerns interpretive questions and the third concerns dynamic or open ended questions. In written assignments, questions are described as "big dynamic open questions" that encourage students to form an opinion, pull evidence to support their arguments.

Creative functionings

In HHS, creative functionings are closely tied to critical and communicative functionings. For example, for the Independent Studies course, projects are assessed based on rubrics that also include an evaluation on how students communicate the findings of their presentation in creative ways such as through a dramatic presentation. For example, in highly technical projects, students must find creative ways to share their research in a way that is accessible to their peers and that is lively and interesting as well.

Additionally, the school places emphasis on entrepreneurship. One avenue is via the integrated boarding programme in which students have the chance to meet alumni who are successful entrepreneurs. They conduct workshops on business planning, marketing etc. Students also work on various social entrepreneurship projects where they come up with solutions to help other people.

Similarly in SHS, creative functionings are closely tied to critical thinking when students are encouraged to propose an original idea or suggestion in discussing an issue of when they are encouraged to express their opinions in an interesting and enticing form such as via a website or public service video. For example, in the Global Themes unit on the Renaissance, students take on the role of someone from the Renaissance; they have to make a speech advocating why they should be elected to a humanist board of directors. In another project, students examine a product from the Columbian exchange and look at how it is connected to the drug trade today. Students then make a public service announcement about the drug trade.

4.2   Capabilities – Opportunities and Agency

The benefit of frameworks that explicitly describe functionings (competencies and skills) the school deems valuable is that it enables the infusion of a common language at all levels of schooling from organizational to classroom levels. More importantly, such frameworks encourage a more holistic range of competencies. However, one of the possible limitations is that frameworks that focus only on functionings (competencies and skills) may lead to less attention paid to the opportunities and agency given to support human well-being and flourishing. For example, when teachers are encouraged, during observations to infuse the teaching of competencies specified in the framework, less attention may be given to the kinds of pedagogies that provide students the opportunities and agency to develop functionings they value. In this study, the added layer of HCA provides researchers with the ability to identify valuable opportunities that students are given as well as ways they are empowered with agency. The following are some descriptions.

Opportunities to develop areas of interest

HHS tries to ensure that numerous pathways and opportunities are open to students to pursue what they are interested in even though this is balanced with the core academic curriculum. At the curriculum level, this is observed when students are given the freedom to decide the kinds of independent research projects they want to work on, who they choose to work with and the teachers they want to advise them on their projects. At the programmatic level, the school organizes what they call a "Sabbatical Week" at the end of each semester. In that week, formal classes are suspended and teachers are free to teach any course of their interest. Often this is done together with students. Students are also free to sign up for courses they are interested in. Courses often include topics that are not covered in the formal curriculum but may have high interest value such as learning about jazz, discussions about philosophy etc. For students who want to further develop their interest in a specific field, the school has three flagship programmes – Science Math Talent Programme, the Humanities Programme, and the Bicultural Studies Programme. Students are selected to these programmes based on their academic performance in the subject area and the programmes provide more enhanced and in-depth content that stretches students' learning.

In SHS, the opportunities for students to pursue their areas of interest can be seen in the wide range of courses offered that appear more varied than courses in mainstream Singapore schools. For example, in English/Language Arts, students have opportunities to study Caribbean literature, Irish literature, Visual literacy, Critical analysis of film & literature, Journalism, World drama etc. A course titled "Research and problem solving" covers scientific research, environmental science problem solving, engineering and applied Physics. There are also courses in Media studies, Computer science, Earth sciences, Physical education and health, World languages covering Latin, German, French, Spanish, and Italian. One language teacher describes how the Italian programme started because there was an interest in this language, partly due to a relatively large Italian-American community in this area. The programme was eventually approved with a large number of seniors signing up because it catered to their interest in the language and culture. As the Principal explains, one key aim of the school is to help students find their potential by providing as many opportunities for them to follow their curiosity because curiosity may develop into a passion.

Opportunities to broaden experiences

School is not just a place where students gain content knowledge but a platform where they gain valuable, enriching experiences. In HHS, students are given numerous opportunities to develop leadership experience – this means the experience to manage and lead teams for purposeful reasons. This occurs at various levels. At the class level, each class has a committee in charge of managing the classroom and organizing class activities. At the consortium level, each consortium has its own student council that is in charge of looking into the welfare of other students in the consortium. Additionally, students are given opportunities to organize events such as the school-wide Chinese New Year celebrations and other minor events. Each consortium also has a mentorship programme where senior leaders mentor junior leaders. At the school level, events such as the Student Leaders Convention and Asia Pacific Young Leaders Summit, an event that brings together student leaders from different schools around the world, are organized by student leaders. An important part of HHS's education is that students must acquire, in addition to knowledge related to their academic subjects, leadership experience involving organizing and managing people and events. Such experiences are valuable in equipping students with leadership dispositions such as how to manage conflicts, how to see the macro purpose of an event as well as the micro details, how to market an idea, and how to inspire others to follow one's ideas.

In SHS, students also have opportunities to develop learning experience beyond the classroom. One key feature is the internships which started about five years ago. Today, about 96% of the senior class undergo internships about 3-4 weeks before graduation. Students obtain a placement in companies in the community or elsewhere and this is based on their interest and sometimes curiosity about a particular profession. There are many opportunities for students to develop leadership as well as through the wide range of student clubs/organizations as will be elaborated in the following section.

Strengthening student agency

The provision of opportunities to pursue areas of interest is significant but means less if students are not empowered to make choices. In HHS, the strengthening of student agency is observed in several aspects. The first is the broader systemic priority given to ensuring student well-being. Thus, the school has a Director of Well-being. Her goal is to come up with programmes and processes that will increase the socio-emotional development of students in the school. Working with a team of teachers, the Director pays attention to students who require counselling and may be struggling with their studies. The second is rethinking the position of teachers not only in the role of content providers or authority figures but also in the role of learning advisors. The school is positioning teachers as "learning advisors." The Principal explains that this change of name is indicative of a change in mindset so that teachers are seen as mentors, advising students on the learning process. This change also highlights how students must become agents of their own learning and not become dependent on teachers. Teachers are therefore not to be seen as answer-givers but advisors in their journey of learning.

Student agency is also observed on occasions when the school provides avenues for students to raise questions and debate school policies at open forums attended by the Principal and school leaders. One event the school has recently introduced is the student-led forum. This is held once a year for all students. Each student must prepare a presentation, using his portfolio or other materials that demonstrates what he has learned, the process of learning and his aspirations. Students are guided on how to prepare their presentations and they present to their parents and 2 teachers, including their form teacher. After listening to the presentation, their parents and teachers will advise them on how to improve or meet their goals. More importantly, these sessions also give parents the opportunity to listen to their child, learn about his interests and what he has done well. By presenting about how they have progressed in their learning, students also become agents and learn to take responsibility for their own learning.

In SHS, student agency is observed in that it is relatively easy for students to form clubs and organizations based on their interest. There are a large number of student clubs in the school. There are over a hundred clubs catering to the diversity of interests from arts, sports, religious groups. The clubs are essentially organic and based on student interest. As the Principal explains, "any student, who has interest in forming a club, if they don't exist already, goes to the Assistant Principal and gets a form, fills it out and that includes the name of the adult teacher who will be the advisor, the number of kids at that point in time interested in the club, how often will they meet. Then I sign it and the assistant Principal signs it, the advisor signs it and they are officially a club." These organic formation of these clubs attest to the opportunities given for students to be agents of knowledge and interests they value and want to pursue. Note that in HHS too, clubs can also easily be formed if students mobilise their peers and submit a form to the Principal for approval.

The development of student agency is also implicit in the culture of openness in SHS. Several teachers interviewed spoke about how it is important that students feel safe to question and explore ideas in the classroom. One language teacher describes how she begins the year by

creating a positive environment where students are encouraged to question ideas. She then encourages them to examine the content covered critically and how it extends their thinking about what they currently know. Another math teacher explains that in her honours class, students struggle with being wrong but she tries to help them understand that not finding the right answers is part of the process of growing. What she encourages them to do is to make observations when they don't arrive at a correct answer. She challenges them to think about why it is wrong, what makes them answer in this way, and what other ways there are of presenting the answer. Instead of fixing the problem for students, she challenges them to explore and experiment with given mathematical problems. In this sense, the key culture of learning she instils is that of learning as discovery. To create a culture of discovery, she fosters student agency by encourage risk-taking and exploring. On a socio-emotional level, she tries to create an environment of care and belonging so that students feel safe and comfortable with exploring ideas with their peers.

4.3   Capacities – Connections beyond the Self

The range of opportunities given and the encouragement of agency are important aspects of an education supportive of human well-being and flourishing but the ends of education must extend beyond the empowerment of self to the other. This segment examines the extent to which cosmopolitan capacities are observed.

Connections to the world
Exposure to the world beyond the school and nation is an important aspect of cosmopolitan-mindedness. In HHS, there is a wealth of opportunities for students to learn beyond the confines of the school. This can occur through cultural exchange programmes organized at the consortium level, overseas service learning programmes, specific overseas trips related to their co-curricula activities (such as their sports or music clubs), and immersion programmes to the satellite schools in China. Of course there is the possibility that such programmes may perpetuate a kind of superficial tourism and thus, should be evaluated on the degree they foster deep cosmopolitan engagements with others. Through the interviews, two examples surface on how such cosmopolitan engagements may be cultivated. The first occurs not overseas but on "home ground" when students must play host to overseas students visiting their school on exchange programmes. According to one of the Consortium Directors, it is the students, not the teachers who coordinate the hosting and part of this involves conducting research about the country the exchange students are from, planning the itinerary, and implementing the programme when the students arrive. Students have to put themselves in the shoes of the person coming to Singapore and ask themselves what experiences they would want to have and why. As he reminds them, "I don't want you to be a tourist, I want you to be a traveller, and there's a big difference there, right? When you're going there as a traveller, you're going there to engage with a different culture, a different social grouping. You're allowing

yourself to be influenced, at the same time influence. What is the kind of experience that you anticipate that you want to have? More importantly, when you're being hosted, what is the kind of influence you would like to have on the others? How can it then be positive, for both?"

The second example is the importance of pre-trip preparation and followup after an overseas trip. For example, the school conducts CQ (Cultural Quotient) workshops to help students understand the background and culture of the countries they visit. Also, since students may be judgemental in comparing their country with the other, teachers conduct follow-up sessions during or after the trips to encourage them to have a better understanding of the context. For example, one teacher recounts the students visit to Tasmania and how students commented about the ways things did not seem as efficient as Singapore. The teacher then engaged the students in an open conversation about this during their nightly debrief session and pushed them to consider how the history, tradition and values of the people may be different as well as the danger of judging others based on their own value system.

In SHS, students are also given opportunities to conduct community service projects in less economically advanced countries. Students have gone to Cuba, Columbia, Venezuela and, South America and were involved in fund raising following the Haiti earthquake. Connections to the world are also encouraged in subjects. For example, in English, the subject, though grounded in European and American voices, has expanded to include other world literature such as an African Studies class. It is here that deep understandings of other cultures can be enhanced. For example in one English class, students read literary and non-literary texts that provide insights into the history of Russia and its present day conflict with Ukraine. Students then write a poem from the perspective of someone involved in this conflict in the Ukraine. In another class, students discuss the concept of "othering" through Toni Morrison's *The bluest eye* and Shakespeare's *Othello*. In a 9th grade biology class, students also connect what they learn to the world through an ecology project in which they apply scientific concepts to making an argument about addressing a global environmental issue.

Developing empathy

The cultivation of empathy involves stepping into the shoes of others, learning to see from the perspective of another. Although it may be difficult to foster deep empathetic sensibilities during the short duration of the overseas programmes, students are given opportunities to get involved in the local community. For example, during their immersion trips to China, students not only sit in the lessons taught by local teachers and experience what local students go through, they also prepare lessons and conduct English lessons in various schools in China. Some of these are primary schools for migrant workers. More locally, the school partners with a heartland school in Singapore and some of their secondary two students have exchanges with these students. For example, HHS students may go to the school and learn about Malay cultural arts as well as interact with the students through sports such as soccer.

In SHS, there are not as many opportunities for overseas immersion although a few students are involved in study abroad programmes each year. However, the cultivation of

empathy is part of the culture of the school in which a spirit of inclusiveness is key. As the Principal reiterates, "we have to build a culture at the school where no one is picked on for being different than what is perceived to be the norm." The school thus emphasizes a zero tolerance towards any form of bullying. Also, they frequently invite speakers perceived as "different" to speak to the students. The Principal describes how, during a recent lunchtime session in the library, a transgender speaker was invited to share his experiences at the request of one of the student clubs – "Gay-Straight Alliance." On another occasion, one of the "lost boys" of Sudan spoke to the students about the massacre going on in his country and how he sought for asylum in America. As the Superintendent explains, the school is not afraid of engaging with controversial topics because this is part of what it means to develop active critical global citizens. He explains that this is because the school is located among a progressive thinking community that was formerly an artist colony. A few years ago, for instance, the school put up a controversial play on the Iraq war which allowed students as well as the larger community to understand the multiple perspectives concerning the war.

An important part of empathy is disrupting stereotypes of the other and this is a key feature of the Global Themes curriculum. One teacher explains how students examine stereotypes of Muslims as a result of terrorism but such stereotypes are disrupted when they examine the background of Islam and compare say, the Reign of Terror during the French Revolution with 9/11 and terrorism. In the topic on Imperialism, students examine the effect of corporations on less economically advanced countries. Students are given simulated projects in which they take on roles of people, oftentimes with views they may not necessarily agree with, and then try to argue from their perspective. Through such discussions, students gain a better understanding not only of views different from their own but the multiplicity and complexity of values as well. This then widens their horizon of understanding about how global issues cannot simply be interpreted from the perspective of dominant countries.

Section V. Enacting 21st Century Global Education in the Classroom

This section presents reports of observations of five teachers from each school site. The observations involve one unit comprising a series of connected lessons stretching several weeks.

5.1   Highlands High School – Reports of Teacher Observations

The reports are arranged in the following order:

1. Ms N, English, Secondary Three, Bicultural Studies Programme (Grade 9)
2. Ms L, Literature, Secondary Four, Humanities Programme (Grade 10)
3. Ms E, Humanities, Secondary Three (Grade 9)
4. Mr L, Science (Chemistry), Secondary three (Grade 9)
5. Mr T, Mathematics, Secondary Three (Grade 9)

Note that in accordance with the university's research guidelines, pseudonyms are given in place of actual teachers' names to protect their confidentiality.
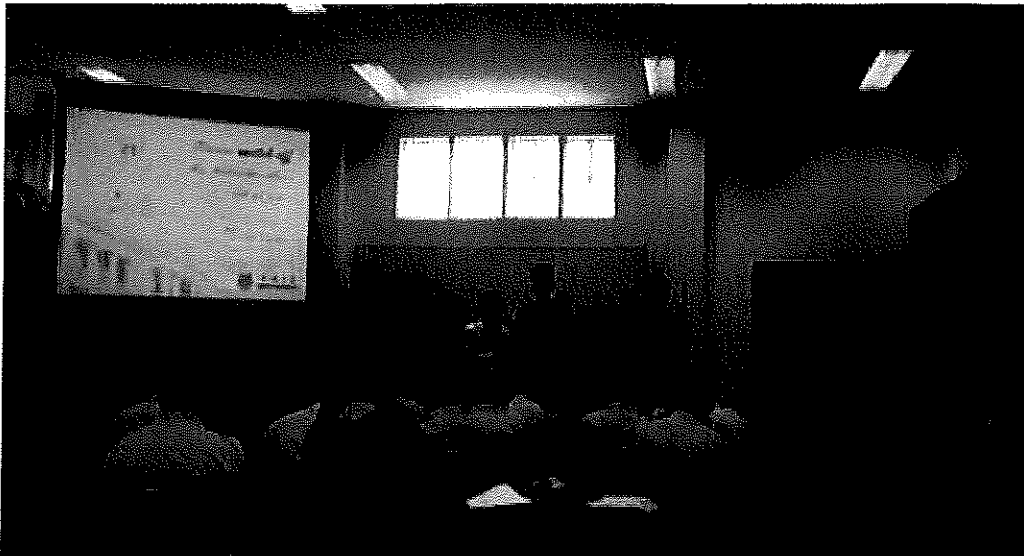
Name of teacher: Ms N
Subject: English
Topic: Education systems; Bioethics
Level: Secondary Three, Bicultural Studies Programme (Grade 9)
Observations: February to May 2014
Report by Suzanne Choo

Introduction

Ms N has been teaching in the school for four years. At the time of the observations, she is Senior Teacher of the Global Literacies initiative and teaches English and the Thinking Programme. Her English curriculum is thematically driven to prepare students for the General Paper (a Current Affairs subject offered at Junior College). Because of this thematic focus, she is able to introduce global issues.

Her main goals are to see learners who are reflective, who are not just able to take a particular position as observed in their argumentative essays, but who should be reflective about their position and the implicit values that have subscribed to. Further, the English class she teaches is part of the Bicultural Studies Programme with a specialized focus on issues involving China and America. However, she tries to get students to connect issues to the wider world. Students not only examine issues from a range of cultural perspectives, they do so via different forms of texts including news articles and films.

One of Ms N's class was observed in February and this involves a unit requiring students to compare education systems. The remaining observations were conducted between April to May centred on the topic of bioethics. Key questions in the bioethics unit include: What is bioethics? What does it mean to be human?

The following summarizes <u>some</u> of the functionings, capabilities, and capacities observed.

Functionings (Critical): Analysis, synthesis, evaluation and comparison
In several lessons, students are encouraged to conduct independent reading and research, analyze and synthesize key arguments and articulate their opinions informed by the texts they have read or watched. In the lesson on education systems, students are divided into groups to present their research on the differences and similarities between Singapore's education system and that of other cities/countries such as Shanghai and the United States. The comparative approach broadens their understanding of their own educational experiences.

Functionings (Communicative): Recognizing assumptions, qualifying arguments
Ms N continually pushes students to be precise about what they say and to clarify the process of their reasoning. At the beginning of the unit on bioethics, she asks students to rephrase a given definition and continually pushes them to identify their own assumptions and qualify their responses with logical reasoning. At various points in the lessons, she makes their thinking visible by asking students to reflect on the kind of responses they are providing and how they contribute to the topic discussed. For example, at one point in the lesson, a student gives an opinion on the issue of cloning and she asks the class, "What is xyz doing here."
Other students point out that the student is providing a hypothesis and she pushes them to think further about the nature of hypothesis.

At other points in the lesson, she pushes students to recognize their own assumptions and links this with essay writing strategies encouraging students to think about how they need to contextualize arguments and qualify their points with evidence to avoid superficial generalizations. Ms N also emphasizes appropriate diction and syntax and often asks the students to rethink their use of language, encouraging them to be more precise with their choice of words in their reasoning.

Capabilities (Critical): Opportunities to explore and question;
Capacities (Creative): role-play
An evident pedagogical strategy in Ms N's class is the space to explore ideas and to question. There is good rapport between her and the students are vocal and highly engaged in the classes. More importantly, the opportunities given are created first by the open-ended debatable nature of questions in which there are no clear-cut answers. One example is the class discussion on the benefits and harm of designer babies. To encourage questioning, Ms N employs strategies such as Socratic questioning. After students have watched the 2005 movie "The Island", they are divided into groups and each group is assigned a particular role related to the characters in the movie. Working from their assigned role, they have to discuss the use of clones for organ

transplant, surrogate motherhood etc. A few guiding questions are provided to initiate the discussion:

1. What are the ethical issues you can identify in the movie?
2. Who should make the decision about whether it is permissible to clone "agnates" for the purpose of organ transplant, surrogate motherhood etc.?
3. What criteria should be used to make this decision? (Lenses: cost, benefits, resources, human rights)
4. How should conflict among stakeholders (other characters) may resolved or addressed?
5. How can a conflict between them be avoided?

Additionally, she asks students to write down other questions they wish to discuss on a piece of paper that may not be part of the suggested questions. This allows students opportunities to raise questions that are then discussed in the Socratic circle. The Socratic circle encourages multiple perspectives to be heard and debated.

Capacities (Critical, Communicative): Engaging in ethical thinking; perceiving from multiple perspectives

In the unit on bioethics, students do not merely interpret and discuss articles in a detached intellectual manner. Ms N pushes them to engage in critical ethical thinking. She explains that students do not have much exposure to ethical thinking and tend to moralize issues – seeing them in terms of normative expectations of right and wrong. However, ethical thinking goes further – it involves negotiating among competing ideas and values and recognizing multiple perspectives from the diversity of social groups that make up our world. Ethical thinking is a higher level of abstract theorizing and allows students to engage in deep philosophical dilemmas that have no easy solutions.

One of Ms N's aims is to enable the students to recognize that ethical issues often involve a range of questions that draw upon multiple and overlapping perspectives. The preliminary discussion and the worksheet exercise highlight the multivalent nature of ethical issues. In accomplishing the exercise, students are taught to think systematically, in a manner that makes them aware about the lenses and assumptions involved in the reasoning process.

Further, students are pushed to consider complex ethical questions and engage in high level theoretical and philosophical discussions related to issues. For example, in the discussion on cloning, students discuss various ethical dilemmas such as whether it is morally right to duplicate ourselves, whether people should be used for utilitarian reasons to fulfill the needs of others and the larger society, and what the essential nature of humanity is.

Capabilities (Critical): Tolerating ambiguity
Because of the emphasis on ethical thinking, students also cultivate dispositions in which they learn to appreciate ambiguity. Ms N shares that initially, students were uncomfortable with not having a clear black and white answer at the end of class debates or discussions. But over time, they have gradually learnt to become comfortable with recognizing the complexities underlying issues. The openness at the end of the lessons also provides them agency to make their own decisions as they navigate complex issues.

Functionings (Critical): Interdisciplinary thinking
The unit on bioethics includes many instances that allow students to apply interdisciplinary knowledge. Two notable examples are their use of *Brave New World* from their Literature class in illustrating a bioethics perspective as well as their use of ideas learnt in their Cultural Differentiation Elective to think about different cultural positions in bioethics. The broad and multidisciplinary nature of this topic, however, ensures that students are always drawing from their general knowledge of scientific developments and social controversies in order to inform their responses in class discussion.

Capacities (Critical): Deepening understanding of social contradictions thereby fostering empathy
Empathy should not be correlated with subjective feelings of pity towards the other. Rather, empathy requires a critical understanding of the contexts that result in the marginalization of the other. In one of the earlier lessons requiring students to compare education systems around the world with Singapore, Ms N's pushes one group to think further about their use of the term meritocracy. Initially, most students in the class accept meritocracy, a key pillar of Singapore's education system, as a fair system of rewards. They do not question this dominant view but Ms N pushes them to consider the ethical implications underlying this, in particular, whether particular groups have the same equal opportunities and resources as others. From this discussion, students recognize that socio-economic inequalities can result in the poor trapped in a cycle of poverty and low achievement even in a meritocratic system. The critical discussion then provides that entry point to help students see from the perspective of marginalized groups in society.

Name of teacher: Ms L
Subject: Literature
Topic: Creation and Responsibility in Frankenstein
Level: Secondary Four, Humanities Programme (Grade 10)
Observation period: February to April 2014
Report by Suzanne Choo
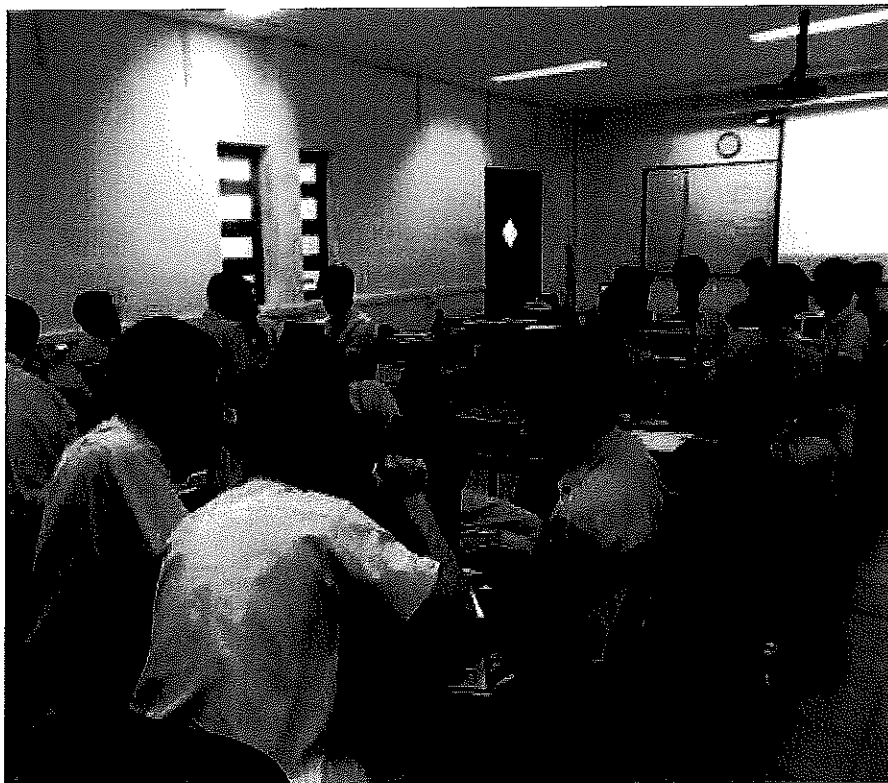
Introduction
Ms L has been teaching in the school for about 7 years. At the time of the observations, she teaches secondary 3 and 4 Literature and oversees the Literature and Humanities programme from secondary three through four.

The unit centres on the key literary text *Frankenstein*. Ms L explains that key literary skills of close analysis are taught but students are also pushed to examine larger concepts such as power and to connect this to their daily lives. A common pedagogical approach is comparative readings in which students compare *Frankenstein* with other texts examining the different aesthetic techniques utilized as well as different treatment of ethical issues.

The following are essential understandings of the unit:

- Understanding characterisation through emotions (including tone).
- Understanding the motivations of the persona through his / her actions and speech as well as what is not said.
- Understanding the values (or lack thereof) that each character holds true through the way they interact with others and react to situations.
- Understanding the underlying principles that guide the actions and choices of the persona through his / her assumptions.
- Understanding cultures through the anxieties / biases underpinning their narratives: representations tell us more about the representer than the represented.

The following summarizes <u>some</u> of the functionings, capabilities, and capacities observed.

Capabilities (Critical): Opportunities to explore and test ideas

The classes observed are characterized by lively and enthusiastic discussions. The environment is non-threatening and students feel safe to explore and test ideas. Quite often, a student may give an opinion which is then countered by another. Another student then counters the other and so on. Rather than feel defensive when their ideas are questioned, students appear comfortable with questioning others and being questioned because of the good rapport and trust they have with their teacher and with each other.

Ms L's role in the class shifts fluidly between that of a facilitator and provocateur. At times, Ms L steps back allowing students to continue generating ideas; at other moments, she steps in to push their thinking further by asking them questions such as "Why is this [point] significant?" or what evidence they have to support their points. She also provokes new ways of thinking about the issue thus expanding their understanding. Students are then given opportunities to build on these new insights. For example, in one lesson when students discuss the idea of the monster in Frankenstein, she pushes students to link the text to philosophical ideas about identity and identity constructions. Ms L also synthesizes the discussion by visually mapping the different ideas on the whiteboard to highlight the points of connection and signification.

Students are also given opportunities to connect *Frankenstein* to realworld issues related to scientific experiments. This independent research gives them the opportunity to pursue their own interests and student presentations provide a range of different perspectives ranging from genetic modification to human cloning, space exploration to Mars, eugenics, biological warfare and experimentation of prisoners during WWII etc.

Functionings (Critical): Analysis, synthesis, evaluating;
Capacities (Critical): Multiple perspectives
The students in Ms L's classes demonstrate their versatility with applying cognitive skills ranging from identifying and explaining evidence, synthesizing points from different incidents in the text, and evaluating characters and the consequences of their action.

In several lessons, students are pushed to examine abstract concepts from multiple perspectives. Following their close analysis of *Frankenstein*, they need to synthesis key points and connect these to realworld issues. For example, in one assignment, students must identify a creation story from another culture or country. They must then compare Frankenstein with other creation stories in order to make critical observations about how narratives relate to human beliefs and, as one student observes, how it rationalizes human practices and social systems.

Students' presentations on various Creation stories provide multiple and differing perspectives on Creator-Creature relationships and introduce them to different cultural and religious worldviews. Students demonstrate the ability to evaluate the effects underlying the construction of Creation narratives, for example, by observing how mainstream society's tendency to ridicule less orthodox beliefs such as Scientology reflects the kinds of narratives constructed and accepted in current society.

Functionings (Critical): Comparison; Intertextual thinking;
Students are constantly encouraged to make comparisons across texts. For example, in one assignment, they read extracts from Genesis in the Bible to infer God's motivations, assumptions, and reactions when He created Man. They then focus on specific portions of *Frankenstein* to also identify Victor Frankenstein's motivations, assumptions, and reactions to the creation of the Monster. Finally, having read both accounts, students are asked to identify the similarities and differences and consider their significance. Ms L provides many supplementary resources and prompts for students to examine which deepens students' understanding of core concepts explored in the novel. For example, students' discussion of the connection of power and responsibility in relation to both Creator and created being, allows them to arrive at a recognition of the text's ideological beliefs about creation and its humanist anxieties about notions of science and progress

Capacities: Connections to realworld issues
In another lesson, students connect their reading of *Frankenstein* with the effects of scientific experiments. Students are asked to utilize *Frankenstein* as a critical lens on how it sheds light on a specific scientific incident or undertaking in the world. They have to give an overview of the scientific incident or undertaking and then explain how Frankenstein shapes their understanding of this.

To further focus the discussion, Ms L has students read about the Stanford Prison Experiment in order to problematize the novel's complex treatment of guilt and culpability in the monster's tragic narrative. Student responses go beyond a simplistic understanding of "stereotyping", and instead reflect a more nuanced perception of how labels/perceptions shape the beliefs and actions of various actors in the plot.

In another instance, students discuss the construction of the monster in *Frankenstein* in relation to modern day serial killers. They consider for example, the psychology and motivations of serial killers in their enactment of violence towards others. The use of the prompts such as "What is foregrounded" helps students read the handout on serial killers as an act of textual representation. The students are then able to see how beliefs and acts of meaning-making are operative in the handout's construction of the "Top 10 most chilling interviews". The students are also able to draw out the social implications of their analysis in what it says about how labels, social beliefs, and acts of rationalisations function in society.

Capacities (Critical): Ethical and philosophical thinking
Ms L's classes are marked by a high level of philosophical thinking particularly in relation to complex ethical issues. Instead of merely focusing on the plot, character, style or other literary techniques, students are able to utilize Frankenstein as an entry point to engaging with abstract concepts and it this way, develop a more metacritical understanding of the role of literature and its connections to ethical philosophy. For example, in exploring the concept of responsibility, students examine such questions as, how one's sense of responsibility affect his actions and beliefs and how one's sense of responsibility and subsequent behaviour (even violent or antisocial) is partly determined by society's responsibility (or lack of) towards him or her. In another lesson, students discuss the concept of free will and the extent to which autonomy is given to man in the in the light of a "natural order" or hierarchy implicit in creation. Such ethical problems are investigated as students evaluate the moral action and interrogate the motivations of characters in the text. They also readily move outside the text to make connections with outside sources (such as popular movies they have watched or supplementary resources mentioned previously) to show how these philosophical ideas manifest in different ways in contemporary society.

Name of teacher: Ms E
Subject: Humanities
Topic: Healthcare
Level: Secondary Three (Grade 9)
Observation period: March to April 2014
Report by Suzanne Choo
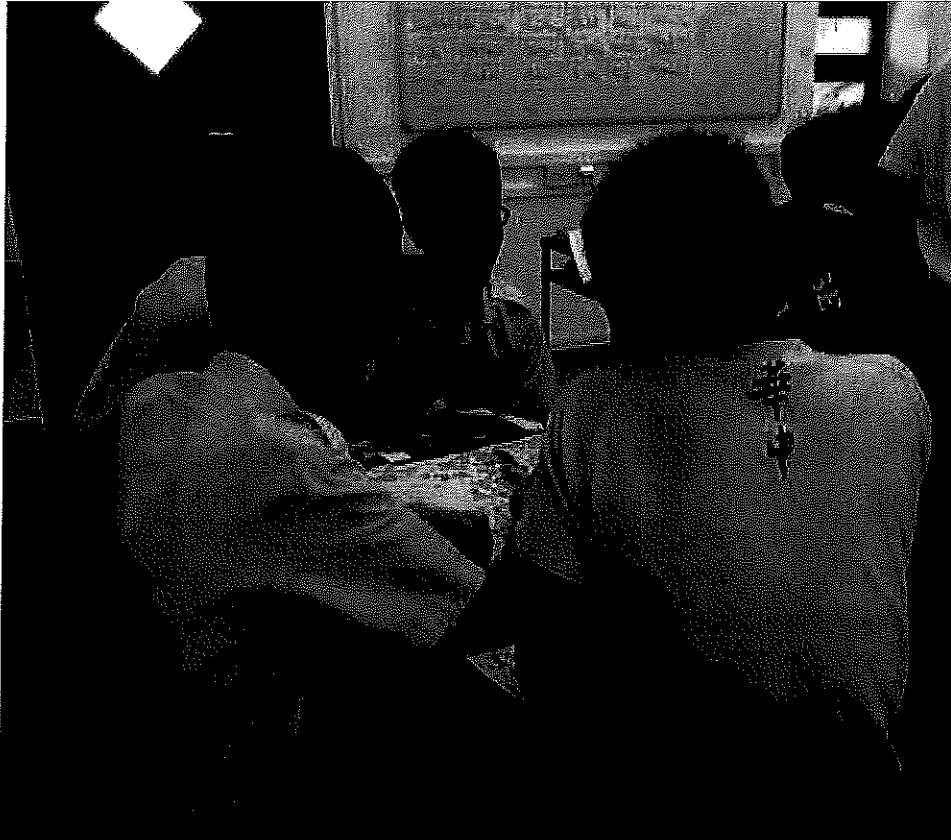
Introduction

Ms E has been teaching for ten years in general and three years in Hwa Chong. At the time of the observations, she is Education Consultant, Student Development. She teaches secondary three Integrated Humanities Core or Social Studies and secondary four History and Social Studies. One of her key aims is to shift students away from over-reliance on the teacher. She explores various student-centred pedagogical approaches such as a model parliamentary session to debate issues as well as Socratic questioning to probe students. She incorporates realworld scenarios to motivate students such as in the unit on comparative healthcare issues when she has students draft a letter to the Ministry of Health to propose changes to the healthcare system.

Ms E pushes students to think deeply about social issues and often expands their perspectives by encouraging students to understand local policies by looking at similar policies in other countries around the world. In this way, students get a clearer idea and are more informed what they make proposes for reform. To her, one important characteristic of a global citizen is to understand that issues are not merely localised but there are different manifestations elsewhere. Therefore, it is important that students are able to recognize and appreciate that there can be multiple and diverse perspectives to social issues.

The unit observed is on healthcare in Singapore. The specific learning outcomes are: Students will be able to:

1. Recognize that policies change to meet the needs of the people.
2. Evaluate the effectiveness of the policies in meeting the healthcare needs of the people and nation.

The following summarizes some of the functionings, capabilities, and capacities observed.

Capacities (Critical): Perceiving multiple layers to an issue
Ms E pushes students to explore the issue of healthcare from many angles. She provides students with comprehensive definition and framework of healthcare and explains to them that this involves more than just schemes and medical services; it also takes into account preventive and environmental elements as well. The different areas explored in this lesson are:
- Definition of healthcare and official components of healthcare (based on the World Health Organization, Ministry of Health and other organizations;
- Overview of Singapore's healthcare system, its component schemes, government policies, and stakeholders;
- Recent government expenditure on healthcare and recent healthcare schemes;
- Common issues in Singapore healthcare such as middle-class fears, aging population, hospital facilities etc.
- International comparisons of healthcare in terms of global rankings in efficacy and efficiency.

Ms E begins the unit by highlighting a social phenomenon – that is, Singaporeans are quick to judge and complain. She tells students that she doesn't want them to simply be judgemental without being a properly informed citizen. She explains that it important that they examine the issue deeply in relation to its effect on Singapore society as well as broadly in relation to its similarity of difference as compared to other countries. Ms E's role is to provide students with key concepts and expand their perspectives so they would effectively evaluate healthcare.

Ms E provides various sources such as statistics, models, documentaries, speeches, and news articles to give students a comprehensive understanding of the issue. In addition to this, she also uses anecdotes to familiarize the students with actual lived experiences and grievances with healthcare in Singapore. For example, at one point, she explains what it means to be asset-rich but cash-poor by describing her parents' struggles in the past. This enables students to understand how policies impact individual lives and develops their sense of empathy as well as helps them recognize the need for good healthcare policies.

Capacities (Critical): Encouraging global perspectives

In discussing healthcare, Ms E also presents published statistical comparisons of national healthcare systems in order to enable students to situate Singapore's healthcare system against those of other countries.

In a resource package, she has students analyze and annotate closely articles on efficient healthcare systems in the world, health care in Hong Kong, United States and Singapore. Among the questions students address are higher order evaluative questions related to whether the source is reliable and whether there are gaps in the article.

In one lesson, Ms E gives the example of the Rwandan healthcare system, and how they have dramatically improved following the genocide. She explains that this is the case because Rwanda has expanded the healthcare system by tasking welfare groups to conduct home visits and vaccinations outside of the hospital setting. She then asks students, is this feasible for Singapore? Why not? She explains that Singapore is expanding her social worker networks and there are already nurses conducting home visits in order to prevent repeat cases from occurring; it may thus be feasible, she suggests. She introduces the case of Rwanda as an illuminating contrast. Her questions are designed to encourage them to consider various factors that enable Rwanda's system to work and to consider if these would work within Singapore's context.

By providing these additional sources, she helps students have a fuller picture of Singapore's healthcare system in relation to the world and this comparison allows them to make more informed evaluations about the country's healthcare system.

Capacities (Critical & communicative): Independent research

Having discussed different articles on healthcare policies in Hong Kong, the United States, and Singapore, Ms E provides opportunities for students to engage in research. They are free to select one healthcare system and must describe the positive and negative aspects of the healthcare systems as well as show how it compares and contrast with that of Singapore. She encourages students to use this research assignment as an opportunity to discover insights into different approaches to healthcare. She also pushes them to read both comments in mainstream media as well as more critical comments in order to obtain a balanced view.

Functionings (Critical): Evaluating sources
Ms E's role is that of provocateur. She constantly pushes students to go further in their investigations by questioning the logic and soundness of their research. For example, while groups are conducting independent research, she walks among the groups to ask probing questions and it is clear that she is primarily interested in developing students' thinking skills. Thus, she constantly pushes students to think critically about their research questions, comparisons, and evaluations. She also wants them to be aware of the existence of alternative and multiple perspectives surrounding issues.

Capacities (Critical): Connections to realworld problems
In a culminating assessment, students are given a realworld scenario and are to write an email to the Ministry of Health. In the email they must:
- Compliment Singapore current healthcare system
- Give a critique of the shortcomings in Singapore current healthcare system.
- Offer solutions, using other countries' healthcare system as an example.

The first task requires students to critically analyse and evaluate the good in Singapore's healthcare system given what they have learnt about healthcare systems, Singapore's needs and context, and other healthcare systems. Ms E asks them to consider Singapore's rankings in terms of healthcare systems in the world and other known strengths, for example.

The second task requires students to use critical analysis in order to form informed judgments of problems in Singapore's healthcare system.

The third task requires them to actively propose solutions but to do with a global mindset justifying their suggestions based on what they learnt from beyond their nation.

Functionings (Critical): Comparisons
In one presentation, a group highlights Israel's healthcare system and discusses the lack of specialists for an aging population. Ms E pushes the group to provide a fuller picture by encouraging them to also examine how Israel relies on healthcare workers from among its citizens unlike Singapore which depends on many foreign healthcare workers. In other student presentations, it is clear that some groups may not have adequately provided sufficient analysis of another country's background and context in their analysis of the healthcare systems. However, Ms E's lessons are marked by a key focus on comparative thinking and evaluation. She often provides case studies to facilitate comparison. While highlighting what can be learnt from other countries, she also points out contextual details and differences between the cases studied.

Name of teacher: Mr L
Subject: Science (Chemistry)
Topic: Compounds and materials, introduction to covalent bonds, covalent bonds: lengths and reactivity; Drawing covalent substances and physical modelling of molecules
Level: Secondary Three (Grade 9)
Dates observed: January to April 2014
Report by Suzanne Choo

Introduction
Mr L has taught for nine years in the school. At the time of the observations, he teaches secondary three and four (grades 9 and 10) Science. He is the second head of Science in charge of the chemistry unit and is also in charge of the Math and Science Talent Group in the school.

In terms of pedagogy, Mr L emphasizes critical thinking and tries to mimic what real scientists would do. Thus, there is a strong element of inquiry, collection of data, observation of trends, and formulation of concepts. In this sense, students are introduced not just to content but to the scientific process. In a number of his classes, he provides students with data relevant to the topic studied and gives opportunities for students to make sense of the data, observe patterns and theorize from the data. Students have to justify their reasoning and back it up with research.

As a teacher, he does not spoon feed his students with all the answers. He encourages students to raise questions about the content covered but does not readily provide all the answers. Instead, he

encourages them to seek the information and to learn to synthesize knowledge from various sources.

Throughout Mr L's lessons, there is a strong emphasis on the following disciplinary skills: questioning, observing, generalising, conceptualizing, imagining. The teacher's elicitations and worksheet questions are often intended to facilitate such thinking. Where possible, there is a great deal of independent work: students are given concepts and data sets in the worksheets in order to help them discover trends and hypothesize explanations.

The unit observed focused on Compounds and materials, introduction to covalent bonds, covalent bonds: lengths and reactivity; Drawing covalent substances and physical modeling of molecules

The following summarizes some of the functionings, capabilities, and capacities observed.

Functionings (Critical): Observation
In Mr L's lessons, there is a heavy emphasis on empirical observations and thinking. Students are pushed to observe trends and form their own conclusions using previously acquired understanding and theory about the topic. Mr L carefully curates data in such a way that the students may be able to draw connections on their own.

For example, in one lesson, Mr L breaks the class into groups of three to discuss data that he provides. He says, "What I have here is two sets of data for you. One set is on covalent bond length... the other set of data is called atomic bond energies." The teacher then asks students to find a set of consistent data from the given information and observe trends about the bonds. He then encourages students to justify their observations based on scientific principles they have learnt. Following this, he tells students to examine other sets of data and see if these observed trends are consistent and what scientific principles can inform this.

At times, Mr L pushes students to think about gaps in the observations. In the lesson on compounds and materials, Mr L asks students to think about what they have learnt in previous lessons concerning characteristics of ionic bonds. One student observes that as "as ionic increases, the radius increases." Mr L then points to an exception or anomaly in the given table of compounds. He then asks students to rationalize these anomalies.

Functionings (Critical): Concept mapping and connections to prior learning
At the beginning of the unit on covalent bonds, Mr L provides a concept map to provide parameters and guidelines to the key ideas students will be engaging with. The concept maps show how different sub-topics covered in the unit are all connected together and provides a macro road map to help students track learning and see connections among concepts.

While students are provided with an overview of the unit, they are also asked to recall what they have previously learnt about the topic. For example, Mr L asks "What do you know about covalent bonds?" He then situates the topic in relation to other topics in "Chemical Bonds". This helps the students to be more conscious of their process and progress of learning.

There is a strong focus on concepts and their interconnectedness in the unit. This is perhaps due to the highly theoretical nature of this topic – the understanding of chemical bonds and its relevant concepts is foundational to Chemistry as a whole.

Functionings (Critical): Visual thinking

In Mr L's lessons, there is a strong focus and an explicit emphasis on being able to visualize physical processes. Through the use of diagrams, the teacher often explains the process of bond formation with reference to the actual physical shapes of molecules. For example, in one lesson, Mr L encourages students to visually imagine how the actual physical shape of an atom affects how covalent bonding occurs. Mr L then encourages students to generate observations and questions from their study of the diagrammatic representations of covalent bonds on the whiteboard.

Mr L also emphasizes the importance of visualization and visual thinking through video clips and demonstrations. Students are also expected to have an imaginative understanding of the topic; they are discouraged from thinking about chemistry only in the abstract. They are expected to be able to visualize how concepts operate and how they connect using diagrams and visual maps. Mr L supplements this with teaching aids such as flash animations, video clips and actual demonstrations in order to help them "see" and understand these concepts. In one lesson for example, a student was able to borrow concepts from Biology in order to answer another student's question about how molecules are conventionally depicted in chemistry diagrams.

Capabilities (Critical): Inquiry based learning and questioning

At the beginning of the lesson on covalent bonds, students are tasked to research definitions of the concept and to complete an empty table to be shared with class. In this way, students find out what the concepts mean first before Mr L guides the discussion.

The emphasis on the skills of scientific inquiry is especially evident in Mr L's correcting of the class's understanding of trends. Trends, he reminds them, can only be used to predict, but not to explain. The teacher reminds them that "this goes back to first principles", which reveals that the students may have been taught something about the philosophy of scientific inquiry before.

Broadly, classes are interactive and students are not afraid to ask questions. The students are often able to generate provocative questions that push the level of inquiry in the class. For

example, in one lesson a student asks Mr L about the magnetism of gaseous air following the video about oxygen's magnetism. The students also raise questions about their own findings in a way that allows the discovery of a third principle that isn't actually in the present syllabus. In this lesson, the students demonstrate great level of curiosity about the topic and their questions allow Mr L to extend the lesson beyond the topic.

Capabilities (Critical): Independent research

In a lesson examining covalent bonds, there is a great emphasis on independent inquiry and the acquisition of the skills of scientific inquiry. In this lesson, students are allowed to apply what they have learnt about the topic previously in order to discover new concepts. Mr L curates data in such a way that students would be allowed to discover different principles and even exceptions.

The class has an online wiki of chemistry topics, which the students are expected to update and fill with their personal reading and research. Much of the class content is kept online, and referred to by the teacher during the lesson

Capacities (Critical): Connections to realworld issues

As a culmination to this unit observed, students have to make use of their understanding of materials around them to show how Chemistry can be applied to realworld cases. For example, as they learn about graphites and diamonds, they also explore how carbon nanotubes is used in electronics and how they can make miniature machines the size level of molecules. In another example, he highlights how new aircrafts like the A380 and the 787 are made up of carbon composites. He then gets them to think about the difference between building this aircraft out of aluminium instead of carbon fibre. Students then consider the benefits and disadvantages of different materials as applied to aircrafts.

Name of teacher: Mr T
Subject: Mathematics
Topic: Quadratic forms and graph properties; introduction to indices; and logarithmic and exponential equations.
Level: Secondary Three (Grade 9)
Observation period: February to May 2014
Report by: Suzanne Choo

Introduction

Mr T has been teaching in the school for 7 years and this is his first school. At the time of the observations, he is Education Consultant for mathematics and coordinates the level two mathematics, aside from this daily role as a mathematics teacher. For him, it is important to give students opportunities and ownership of their learning. This involves allowing students to voice their opinions and to explore ideas. As evidenced in his classes, he emphasizes the importance of not simply giving students the answers but designing a learning process so that students learn to reason and work out solutions themselves. In Mr T's mathematics class, there is strong attention given to getting students to first understand problems and figure out how to solve them in teams. Often, Mr T gets them to compare and contrast different methods to solving a problem and then discussing which is more effective.

In the lessons observed, inductive learning is predominant – this allows students to experience a number of problems on their own before theorizing from it. In this way, students arrive at a deeper understanding of abstract concepts in mathematics. More importantly, by focusing on conceptual understanding, they are then able to readily apply them to realworld cases.

During the lessons observed, the mathematics topics covered included: Quadratic forms and graph properties; introduction to indices; and logarithmic and exponential equations.

The following summarizes some of the functionings, capabilities, and capacities observed.

Capabilities (Critical): Opportunities to explore and discover
One prominent pedagogy Mr T employs in inductive learning. Students are often asked to attempt questions and to explain how they arrive at their solution. In one lesson on indices, he begins by asking students what they have learnt about it before teaching the topic. Students respond by giving him their observations which he then expands on to deepen their knowledge. In another lesson focusing on exponential and logarithmic groups, Mr T begins by writing a problem on the board. He says: "As a warm up, see if you can draw this: $Y = x2 + 2x + 1$ and $Y = (-x)2 + 2(-x) + 1$." He asks students to think about the conditions needed to solve the problem. Students have the opportunity to use their ipads to manipulate graphs, to try out different computations and they attempt to create an appropriate graph to address the question. He then asks students to make observations and articulate what they discover about the graphs they have drawn on their ipads. Using what they observe, he then introduces the key principles underlying exponential graphs. In these examples, students are encouraged to explore, discover and observe before the teacher extends their understanding of learning points.

Functionings (Critical): Comparison to elicit understanding of concept
In the lesson focusing on exponential and logarithmic groups, Mr T has students observe and compare graphs in order to grasp the concept behind it. He asks: "If this graph looks like this $y = x2 + 2x + 1$, how will this graph look $y = - (x2 + 2x + 1)$?" and later "What would this look like: $Y = x2 + 2x + 1 / Y = (-x)2 + 2 (-x) + 1$." Students try different variations of the graph on their ipads and at the end, he asks them to articulate their observations. Through this, he pushes them to investigate the characteristics and relationships of exponential and logarithmic graphs.

Similarly, in the lesson on indices, Mr T has students try different methods to solve a problem. Each student presents his method before the class and he gets them to compare different methods. For example, he encourages students to assess the mathematical problem and then apply the laws of indices in an intelligent fashion in order to obtain solutions in the most efficient manner. In a lesson on quadratic equations, Mr T presents a table which identifies the different possibilities with each form of the quadratic equation. After going through the properties and limitations of each form, he asks the students to identify when each form is useful when trying to

sketch a graph. At the end of the exercise, he shows a table on the board which details the limitations and the strengths of each method. In prompting the students to think about the "greatest form" (the most useful form for sketching quadratic curves), he challenges students to critically consider each form for its relative qualities and strengths. The use of the table facilitates this by encouraging students to categorize each form in relative terms to each other. This exercise encourages students to categorize and evaluate their knowledge of these forms when applied to a mathematical task. This is a critical approach, as compared to a mechanical approach (rote memory and application), to problem-solving.

Functionings (Critical): Anecdotal application to personal social world

In the lesson focusing on exponential and logarithmic groups, Mr T challenges students to think about the application of logarithms to real life by asking them about occasions when they forget to take their medicine. "Is it true that if you skip one dosage, you can take double the next time?" He then tells them about how the use of logarithms can help them figure out the right dosage to take.

Functionings (Critical): Contextualizing data

A key element of contextualization is historicizing knowledge. In one lesson on indices, students are encouraged to research on the background to a formula and present this in class. One student explains Pythagoras and irrational numbers which presents a lively way of introducing the topic.

Functionings (Creative): Re-imagining / analogizing

In the lesson on quadratic equations, Mr T has students work in groups to think about creating an analogy to illutsrate the usefulness of a mathematical theory. For example, one group uses the analogy of "terrorists versus a country" in order to help better explain the function of a discriminant. Encouraging students to create analogies of mathematical formulas not only provides space for creative interpretations, it helps students explain complex theories in interesting ways.

To help students understand the concept of logarithms, Mr T introduces an innovative "Folding paper" activity. First, he challenges them to see how many folds they can achieve with a given paper according to the instructions given. Half the class is to fold the paper into 2 sections each time, while the other half is to fold it into 3s. He then asks them how many folds they manage to get and completes the table as the students share:

# of folds	1	2	3 ...	6
# of sections	2	4	8 ...	64

Mr T then asks them to observe patterns and to put their observations into a mathematical statement. Mr T then asks them to present their solutions graphically. The graph shows an exponential curve and he explains how it reveals an exponential relationship between the two variables. This activity helps students concretize abstract concepts and helps them understand how theories work in reality.

Capabilities (Creative): Opportunities to try and fail

Mr T encourages students to experiment with ideas and failure to produce a desired outcome is part of the learning process. In one lesson, students speculate and provide creative responses as a result of the various experiments on folding and exponential graphs. For example, one student asks what seems to be an original question. "If we have a positive fold, can we have a negative fold? Do we tear the fold?" Mr T then praises this question and has them explores different possibilities.

Capacities (Critical & Communicative): Connections to realworld problems

In a lesson on logarithms, students are asked to roleplay as representatives of a certain organization of their choosing. They are to represent the organization's case (or argument) in a way that uses logarithms. They are also asked to craft a mathematical question that demonstrates their organization's application of logarithms, and to allow their peers to work on it. The multiple presentations present different realworld applications of logarithms. Students have to explore and research realworld applications, and then engage in roleplay in order to present their findings to their peers.

In one presentation on "Logarithms and carbon dating", students show how they determine the age of an Anubis statue by using carbon dating. Students explain how carbon dating works: scientists calculate the amount of carbon isotopes remaining in an object (since these are known to decay at a steady rate). Students then present the formula for carbon dating, which uses logarithms. The rest of the class apply their formula to calculating a given object's age.

Many of the presentations have the added dimension of drawing together or relating two different disciplines. In this case, the use of mathematics in the study of historical objects (with organic material) is briefly explored; the students briefly explain to their peers the scientific principles involved in carbon dating. This situates their learning within realworld contexts while improving their general knowledge.

Another group's presentation is titled "Math Can Save Lives!" They give the following scenario: The group are members of the World Health Organization (WHO). They investigate disaster struck areas, determine the amount of damage, and attempt to alleviate the situation. An earthquake has struck Ethiopia. There is debris everywhere. There is poor sanitization, and little potable water. They use two formulas involving logarithms: the first calculates an earthquake's

intensity, and the second is a formula used to determine the pH of water. The presentation presents a question: What is the concentration of hydrogen ions must there be in the water to allow pure potable water with a pH of 7? This presentation is noteworthy for presenting not just one, but two ways in which logarithms may be used.

For some presentations, the students focus on the creative application of the formula rather than demonstrating an in-depth understanding of the concept underlying it. In such cases, Mr T performs the role of provocateur by challenging students on the legitimacy of their research which pushes them to think more deeply about the credibility of their data and solutions.

In summary, the investigative approach provided by the activity's roleplaying perspective enables students to connect their learning to realworld applications and contexts in an involved manner. The freedom of choice in their selection of topic allows students to imagine and explore any number of applications. The activity's requirement that each group think of at least two mathematical questions with their imagined scenarios also trains their ability to craft questions.

5.2   Staples High School – Reports of Teacher Observations

The reports are arranged in the following order:

1. Ms H, English Language Arts, Grade 10 (Secondary Four)
2. Ms G, Global Themes, Grade 9 (Secondary Three)
3. Ms P, Social Studies, Grade 10 (Secondary Four)
4. Ms D, Science (Chemistry), Grade 10 (Secondary Four)
5. Ms W, Mathematics, Grade 9 (Secondary Three)

Note that in accordance with the university's research guidelines, pseudonyms are given in place of actual teachers' names to protect their confidentiality.
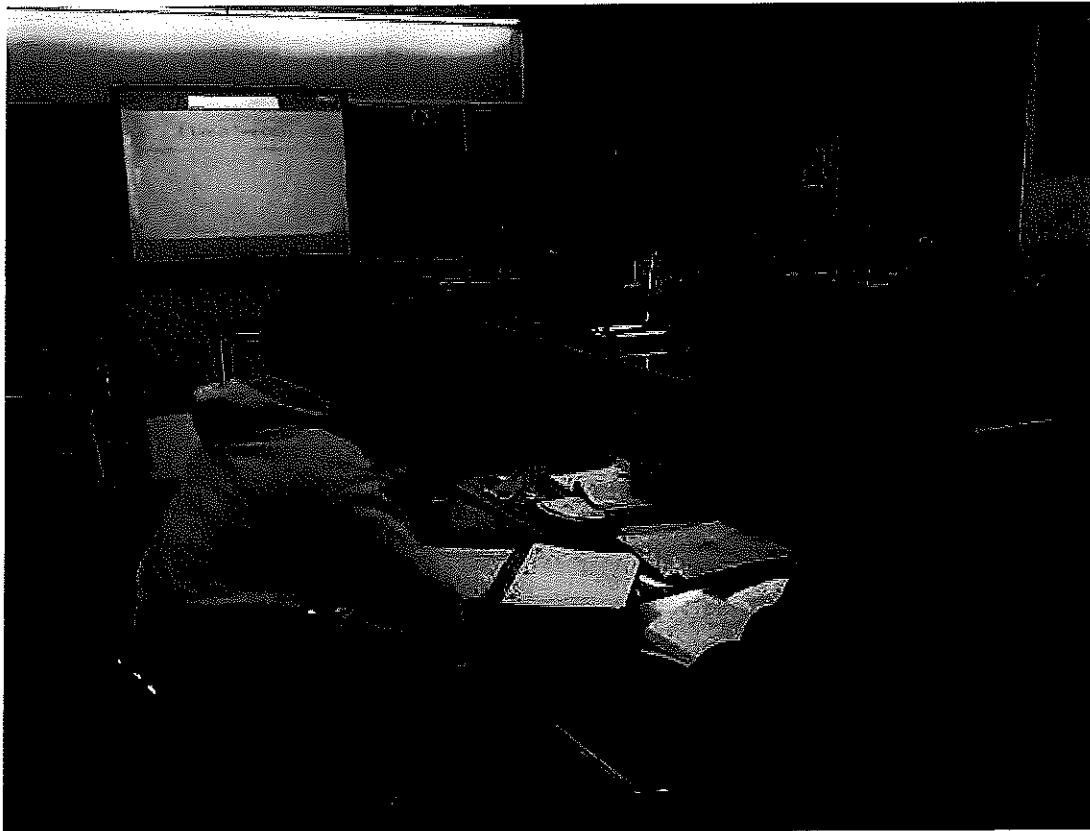
Name of teacher: Ms H
Subject: English Language Arts
Topic: A Tale of Two Cities
Level: Grade 10 (Secondary Four)
Dates observed: March to April 2014
Report by Deb Sawch

Introduction

Ms H has been teaching in the Westport school system for 15 years and has been teaching for a total of 20 years. In 2008, she took a year off to serve in the Peace Corps in China and returned to Westport with a renewed sense of the importance of cultivating multiple perspectives and global understanding in students. In her pre-unit interview, she describes how the Westport 2025 initiative gave her permission to reimagine how she approaches and plans more traditional literature units to contextualize them more globally and in ways that allow her students to make realworld connections that drive them to deeper levels of empathy and potential social activism.

To that end, this unit has three goals: 1) to provide students with opportunities to experience deeper levels of engagement with literature; 2) to develop students' research skills in their efforts to write a full-length, single-topic research paper, and 3) to ignite student consciousness around

global issues and to inspire them to take action. To accomplish this, Ms H has chosen to merge the school-wide required Y10 research paper with a class reading of *Tale of Two Cities (TOTC)* and to focus both reading and writing around the novel's central themes of poverty and social class. Instead of the traditional "free choice" topic for the required paper, she aligns all paper topics to the theme of poverty in the 21st century and asks students to relate it back to how it resonates in the novel, and she ends the unit with a challenge to her students to organize action to prevent hunger and poverty in the local community.

The following summarizes some of the functionings, capabilities, and capacities observed.

Functionings (Critical): Synthesizing; Capacities (Critical): Engaging in Global Issues
Ms H focuses on cultivating critical thinking skills, such as synthesizing, analyzing and evaluating sources while providing students with opportunities to engage in collaborative, inquiry-based experiences that allow them to make on-going connections between fiction and non-fiction as well as between literary themes and realworld issues.

When Ms H originally taught her *TOTC* unit, the focus was entirely text-based, and the unit addressed specific Common Core State Standards:

- Analyze how complex characters develop over the course of a text, interact with other characters, and advance the plot or develop the theme.
- Analyze how an author's choices concerning how to structure a text, order events within it, and manipulate time create such effects as mystery, tension, or surprise.
- Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details

This year, as part of her participation in Westport 2025, Ms H shares the revised essential questions that point to the unit's evolution into one that is more globally focused and one that pushes her students to engage in multiple perspectives:

- Can one person make a difference in society? Think about: what qualities enable a person to make a difference? What forces work against him or her? What drives individuals to struggle to overcome powerful social institutions or conditions?
- How do issues of poverty that people struggle with today compare to what the French and English experienced in the 18th century? How has our attitude towards poverty changed or remained the same since then? What remedies, if any, are offered today?
- How do author's use elements of style and characterization to create social commentary?

The culminating research project is aimed at connecting Dickens' role as a social critic with

contemporary issues of poverty and class in the United States:

- Culminating research project guiding question: We have been discussing Dickens' role as a social critic, and in particular, his concerns and advocacy for the poor and disenfranchised in the 19th century. How do his concerns about poverty and/or income inequality resonate in America today?

While the research paper focuses more on issues of class in the United States, throughout the unit, Ms H shares both fiction and non-fiction text from global sources to illustrate the universality of poverty.

Functionings (Critical): Analyzing and evaluating

Ms H immediately begins the unit by teaching students how to critically evaluate sources so that they will grasp more fully the impact and complexity of poverty. While her students read silently on their laptops, Ms H uploads an article to the Smartboard that explores the experience of students in an impoverished school in the state of New Jersey who must cope with trying to learn in an unsafe, under-resourced building where there is no running water, the walls are crumbling, and there is no money for resources such as books and computers. Ms H encourages her students to reflect, ask questions, respond and share with each other as they read through the text and its accompanying visuals. Ms H facilitates a full class discussion, interspersed with individual reflection and small group conversation. She asks her students to evaluate the source of the article and to juxtapose the editorial orientation of the source to the message in the article. She then asks them to envision potential trajectories for arguments that might result from this kind of article, and what evidence would be needed to support them. Students are fully engaged with this task, and their comments suggest their concern and disgust with the fact that students in cities close to their own have such dramatically disparate experiences and resources in schools.

Ms H provides her students with a "Thinking Hats" graphic organizer, a worksheet that asks students to categorize their responses to the article in three ways—their thinking, their feelings, and their questions. She explains that she wants her students to move from thinking about their immediate surroundings (i.e."[this article] makes me think of our school and all that we have"), to broader, more socially conscious issues (i.e., the impact of poverty and of inferior education on the welfare of children and their futures) as the class discussion progresses. In a post-class interview, Ms H explains that she wants to push her students to move beyond their comfort zone and to trouble issues more critically. By creating graphic organizer of thinking hats, Ms H helps her students experience the kinds of thinking they must engage in when they conduct research.

In another, more intensive lesson on reading and evaluating written and visual texts, Ms H teams up with Mr T, the library media specialist, and creates "reading centres" around the room Computers already loaded with specific articles and corresponding questions that tap into

comprehension, interpretation, analysis, and evaluation, as well as more global questions that require students to make realworld connections and engage in multiple perspectives. She also asks them to note where and how information aligns and contradicts itself across all texts, thus troubling students' notion of non-fiction as "true."

Capacities (Critical): Engaging in Multiple Perspectives/Intertextual Thinking:
Ms H's goals of connecting the *TOTC* text with global issues begins by asking her to reflect on the oppositional opening sentence of the book which launches her students into a reflection on the dichotomies of social issues. She asks her students to split a piece of paper in half with one side labeled "The Best of Times" and on the other, "The Worst of Time." She asks her students to "think about things going on in the world, in your community and your school that fall into both of these columns; where do you see issues of disparity; situations where you see for some people, it was the best of times, for others, it was the worst of times; think of some things you know where people don't have an extra shot; where for some, it's great; for others, it's hard."

The students are unafraid to bring up, discuss, and build upon issues such as gay marriage, drugs, the Russia/Ukraine conflict; Arab Spring, and racism, and are reminded that these are topics to consider when coming to understand the resonant themes in the novel. Ms H explains, "As you know, our work with Dickens has centred around some of his social commentary and efforts for the poor and disenfranchised. We have looked specifically at some of the current issues of poverty in 21st C America. For your paper, you will need to focus on an issue of disparity, disenfranchisement, or social justice in the 21st Century. This should allow you a broad range of possibilities with poverty or some poverty-related issue as a viable possibility, but you would certainly not have to be bound to the issue."

Throughout the unit, Ms H navigates smoothly between use of technology, full class, group, and pair share student dialogue, but nothing seems rushed. In order to gauge student understanding of the novel and to make sure they are keeping up with their reading assignments throughout the research paper process, Ms H uses the class blog as space for reflection, questioning and discussion about the novel.

Functionings (Communicative): Strategic collaboration
From the start of the unit until its end, this is a collaborative experience. Although the students will write their own papers, both their research process in addition to their writing processes, are all collaboratively experienced. As a way to model the power of working with others, Ms H collaborates with Mr T, the library media specialist, to engage in lessons on how to access appropriate sources, critically examine texts, synthesize information, report key findings, and integrate new sources into a larger paper. Together, they utilize strategies to activate knowledge, encourage questions, and sharpen critical research skills. Bringing back the "Thinking Hat" organizer, Ms H and her colleague ask students to use this template to examine sources they will

use in their research papers. Students discuss/defend the usefulness, veracity, and reliability of the texts and sources they have found and select which texts are most effective as objective resources for research.

Ms H constantly seeks to understand the process students engage in to both learn and collaborate. As students work in their groups to evaluate sources, she asks questions such as "What are the first three things you did as a group to approach this challenge?" "How did the team choose the source?" How did you determine the criteria to use?" "How were disagreements settled?" "Write a reflection in which you reflect on the process of collaboration" "How would you assess yourself on the collaboration rubric?"

Formative Assessments:
Formative Assessments include vocabulary and comprehension quizzes as well as reading reflection logs posted on the class wiki. Ms H uses these reflection longs to work with her colleagues who are or will be teaching this text to possibly adapt the lessons for next year and to determine whether there is consistency in comprehension (or not) among the students.

Ms H explains to the researcher that this unit, revised to tie themes in the novel to more contemporary issues and to include a research component, has yielded deeper critical thinking and engagement in her students. She notes increased energy and more sophisticated, informed dialogue during group work, more thorough approaches to research. She feels that the shift in the unit from text as the anchor of the unit to the text as engine for deeper thought and exploration about the world has made a huge difference in her pedagogy and to the experiences of her students as both readers and citizens.
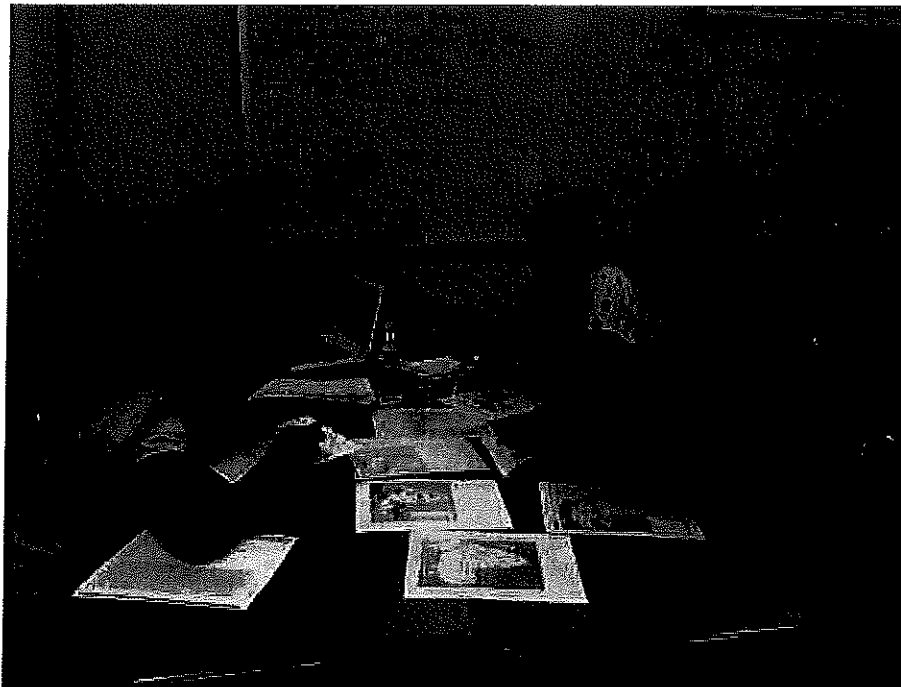
Name of teacher: Ms G
Subject: Global Themes
Topic: Imperialism
Level: Grade 9 (Secondary Three)
Dates observed: April to May 2014
Report by Deb Sawch

Introduction
In 2010, the District introduced the required Y9 Global Themes as a replacement to the Y9 required Western Civilization course that had been offered for several decades. This move represented a direct acknowledgement by the District of the importance of focusing on events and issues that informed and shaped societies around the world and not concentrating solely on issues and events that shaped western cultures. Further, while housed within the Social Studies (Humanities) department, the course was designed to be cross-disciplinary, drawing on scientific, mathematical and literary influences that shaped societies and cultures. To that end, and in part due to the focus of the district's 2025 initiative, Ms G teamed up with a team of volunteer Science, English, and Math teachers to design the course with the following objective: To give students opportunity to work collaboratively to solve interdisciplinary, complex, open-ended global problems to provoke reflection and expand their understanding of the world, drawing on knowledge and skills gained in Math, Science, English, and Humanities.

The essential questions are:
- What role did religion, economics and technology play as catalysts for imperialist actions, and how did the imperialist powers maintain control?
- To what extent were colonized people the victims of conquest or the beneficiaries of it?
- Contemporary Connection: How do we effectively address the legacies of Imperialism?

This unit uses a case study method approach and includes primary and secondary-source research, Socratic seminars, written and oral debates, as well as fiction and non-fiction book groups that support the study of imperialism. As Ms G explains, the entire course is about global consciousness, so the specific cases in this unit will allow students to gain broader perspectives about the entire continent of Africa as they also make connections about other areas where people have been colonized, invaded or coerced into new ways of life. In her classroom, the bulletin board features visual texts that the students had drawn about the effects of invasions, occupations and persecution in countries such as Syria, Venezuela and Ukraine, thus linking historical events to current ones. Key features of the course include:

- Multi-disciplinary approaches to understanding imperialism and feature realworld, problem-based formative and summative assessments:
  - Economic impact
  - Human rights impact
  - Environmental impact
  - Social/political impact
- Use of both fiction and non-fiction texts that provide real and imagined perspectives to provoke and inspire student engagement
- Students work in collaborative teams during all units; culminating project is a collaborative one

Culminating Assignment: The year-end assessment is intended to provide students the opportunity to apply key learnings throughout the course toward a simulated, realworld, contemporary problem through the lens of imperialism in ways that allow students to work collaboratively to understand and address its effects on the political, socio-economic, environmental and social/cultural systems of African countries.

"You work for a major corporation today and have been asked by the CEO to evaluate the company's policies and investments in one of the following regions (Africa, Latin America, SE Asia/India, or the Middle East). The company is facing pressure from stockholders, environmental activities, human rights activists, local governments, local citizens, competing corporations and consumers. The CEO wants you to present to the Board of Directors your findings and recommendations for improving company policy and investment. The Board will

choose ONE new initiative to implement. The chosen initiative will improve company policy and investment and provide long-term success."

The following summarizes some of the functionings, capabilities, capacities observed.

Functionings (Critical & creative): Synthesizing and analyzing, simulating; Capacities (Critical): Engaging in Multiple Perspectives
Simulations drive this course. Ms G starts the unit with a simulation activity that asks students to use a decision-making process that integrates economic, political, geographic and social issues to determine the optimal way of expanding cotton production in an African region colonized by the Europeans – either through peasant production or through large-scale plantations. Here, students play the role of economic advisors to European colonizers. These are actual scenarios from historical events, although students are not told this. Ms G explains to the researcher after class that she wants her students to engage in this activity without knowing what the actual outcome was so that they can understand the process through which decisions are made from different perspectives, and the implications of those decisions on key stakeholders within the context of colonization, including its residual impact on Africa today. Ms G explains that this activity sensitizes students to the importance of understanding multiple perspectives will inform how the students approach the culminating assignment at the end of the year.

The students work in pairs as they read the activity sheet and begin to think through the decision process on which way to go regarding cotton production in Mali. Ms G gives them a thinking process as a guide:

1. List all reasons you can think of that would support the development of large plantation-like cotton farms in your country

2. Now list all the reasons you can think of that would make this a poor decision.

3. List all the reasons you can think of that would support the strategy to emphasize small farm production of cotton.

4. Now list all the reasons you can think of that would make this a bad decision.

5. Which decision do you recommend and why? What else do you need to put in place to make your recommendations work?

6. Economic decisions lead to consequences, some of which may be intended and others unintended. What do you think some of the consequences, good and bad, of theses decisions, may have been?

Students are given economic objectives and realities of the colonial state; climate and geography; facts about cotton; realities of small-scale subsistence farming in Mali – facts/conditions about each region that will inform their decisions. Students are then given time to prepare a 2-minute presentation to the class defending their group's position. As the students get ready, they argue their positions, discuss major talking points and suggest, and then address, potential opposition to each point. Some students create short Powerpoint presentations to support their points-of-view; others write speeches; still others use notes that they have collectively written. In all cases, students defend their positions by citing sources they have used to research their particular geographic and suggest implications for their position.

Capacities (Critical): Suspending judgement and tolerating ambiguity

Ms G provides her students opportunities to suspend judgment and tolerate ambiguity and to imagine outcomes through these simulation exercises. She withholds the actual outcomes so that her students can engage in a more unbiased approach to their decision-making process. Ms G realizes that students are making huge, and in many cases, naive assumptions, but she holds back on commenting on their positions, she explains, so that they will eventually see for themselves the impact of colonization (economic, political, social, geographic, etc.) on Africa and its people as well as on the colonizers themselves.

Capacities (Communicative): Strategically collaborating

Ms G then expands the exercise to include multiple country case studies. She assigns pairs of students the task of creating their own case study on a colony/country of their choice in Africa to demonstrate how, why, and to what effect Europeans colonized that particular region. The goal is to understand what imperialism is, why it exists, and the impact it has on colonized countries. Student groups choose their countries and are given suggested resource links, although they are not required to use any specific resource. Ms G explains that the goal is for students to become experts in their particular region so that they can eventually argue the question, "How did European Imperialism Affect African culture?" during a Socratic Seminar later that week. Because these cases are part of a class Google Doc, students can refer to one another's cases as they prepare in advance for the Socratic Seminar.

Functionings (Critical): Intertextual Thinking

Throughout the unit, the students work in book groups of about six students each. The goal of the book groups is to allow students to engage in conversations about "How did Imperialism affect African Culture?" using both fiction and non-fiction texts for perspective. Students can choose one of five books:

Fiction:
Things Fall Apart, by Chinua Achebe
Little Bee, by Chris Cleave

Non-Fiction/Memoir
The Dark Child, by Camara Laye
Unbowed, by Wangari Maathai
The Lonely African, by Mr T M. Turnbull

Guiding questions for all book groups include explorations into characterization and style as well as questions about the political, economic and social impact of imperialism on Africa and its people. Students also keep reflection logs so that they can record their responses to the readings and use these logs to inform class discussions. Again, Ms G worked with the English Language Arts department to select these texts and to structure the book groups so that students would benefit from literary explorations as much as they would from a more analytical examination of the conditions and contexts featured in each text.

Capacities (Critical & Communicative): Engaging in authentic realworld/global issues from multiple perspectives
In preparation for their culminating project and to demonstrate their ability to engage thoughtfully and expansively in multiple perspectives, students have been studying primary source writings from Adam Smith, Karl Marx, and Charles Fourier in order to better understand their philosophies. They are completing an organizer that tracks their understanding of key ideas of each philosophy; views on society and divisions in society, and views on property; the advantages and disadvantages of each philosophy; and examples of a country today that follow that particular philosophy. They will apply their understandings to realworld scenarios using an NPR (National Public Radio) website that describes conditions in China at the Foxcomm factory that produces Apple products, such as the iPhone. This will allow students to contextualize current events within deeply-rooted philosophies that gird modern-day governments and policies. In their groups, students struggle to understand the difference between socialism and communism. Ms G asks students questions, such as "If you were a communist, what would you do here?" and "Why isn't Great Britain communist?" Students engage in lively debate as they use their laptops to access sources that support their arguments.

When students do complete their final project, Ms G, as she has done in the past, will invite a panel of external experts to listen to the presentations. Students will create a website for their presentation that allows them to upload economic analyses; geologic and geographic effects on mining the minerals that are used in the production of Apple products; and social, political and cultural implications of using conflict minerals in the production of a highly profitable, global product. The external panel, usually comprised of administrators, professionals and community members will provide feedback to each group. As Ms G explains, an authentic audience honors the work of her students and compels them to engage in realworld problem-solving with depth and care.

Name of teacher: Ms P
Subject: Social Studies (US History)
Topic: US Foreign Policy
Level: Grace 10 (Secondary Four)
Dates observed: March to April 2014
Report by Deb Sawch
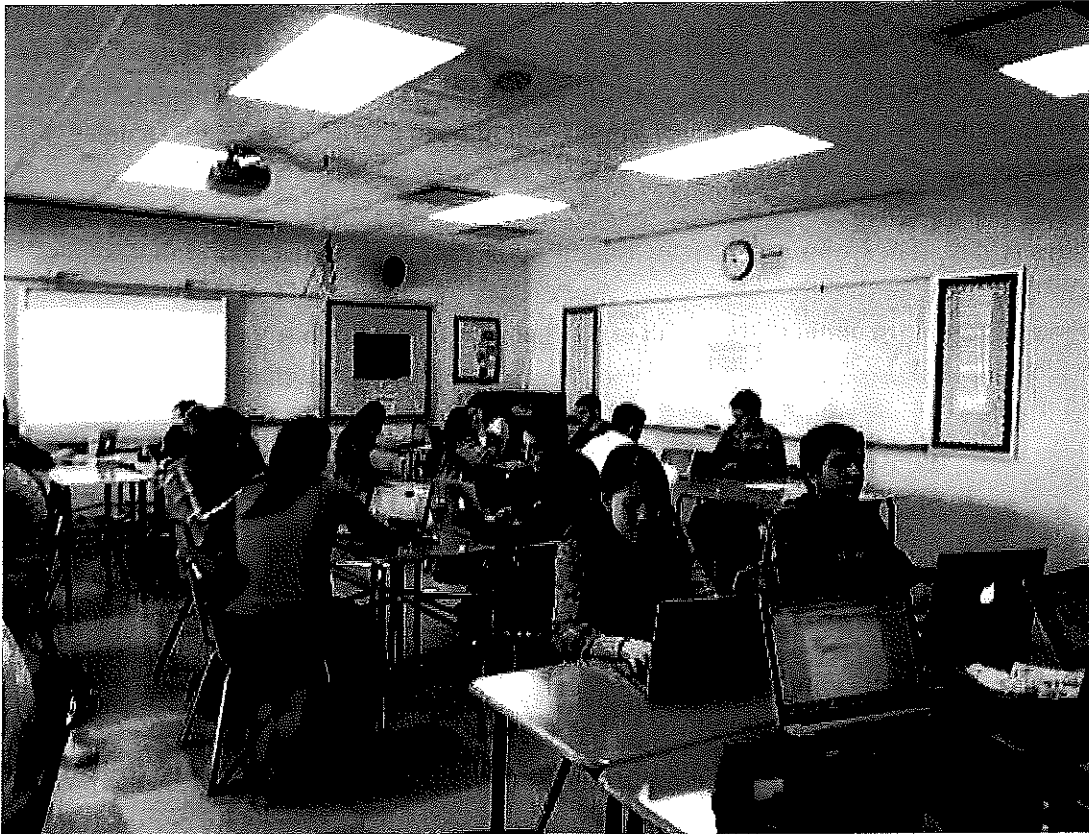
Introduction
This is the first time that Ms P is teaching this course, and she emphasizes in a pre-unit interview, that she wants her students to focus not on what happened in United States history, but rather on the significance of what happened – how this relates to larger themes of how the United States sets its foreign policy agendas, and why and how this informs current issues and policies in the US and abroad. She explains that she wants her students to take "a 360 degree global view so that student [know that] what we do not only matters to us but to other people in the world." She explains that she wants this way of approaching how we understand history to inform how her students come to understand themselves and how they live their lives.

This particular unit, which runs for approximately five weeks, concerns itself with US foreign policy through a mostly economic context. Ms P clarifies: "So the idea that not necessarily

World War I, World War II and things like that, [but rather] [w]e'll be looking throughout the 20th century what happened, how foreign policy is actually sort of based on our economic interests. And how do those actions contradict or compliment our ideals and values as a nation." She wants her students to use prior knowledge as well as primary and secondary source documents to "disrupt conventions and trouble the notion of the role of the US in foreign affairs."

The essential questions that drive the unit concern themselves with how America's role in foreign policy both informs and is informed by American ideals and values:

1. How does US foreign policy impact or reflect American ideals and values?
2. What does it mean to be an American, and what are American values and ideals?
3. How, and in what ways, is US foreign policy driven by American interests; how do you reconcile economic interests with other values and ideals?

The core text driving this unit is Stephen Kinzer's text, *Overthrow: America's Century of Regime Change from Hawaii to Iraq* (2006)—a 20th century history of regime change and foreign policy actions in the United States As Ms P explains, by using this non-fiction text, her students can begin to imagine how history is written, and, especially, how important author perspective is in informing historical narratives. She will also use this unit to help develop students' research skills as they examine opposing viewpoints and different sources that explain the same time periods. Other assessments for the unit include book groups in which students must read an assigned section of Kinzer's book and "teach" that section to other group members; the development of a "playbook" that captures individual student understandings and reflections of the means by which the US engaged in foreign invasions, occupations and governmental overthrows of countries during the 20th century. Two significant writing assessments are also part of this unit: 1) a revision of one of the chapters in Kinzer's book based on further research using multiple primary and secondary sources; and; 2) a culminating argumentative essay that applies learning gleaned from student understanding of US foreign policy in the 20th Century in order to take an informed position on a contemporary issue in US foreign policy. Ms P explains that one of the most important critical thinking skills she wants her students to engage in is the ability to analyze, synthesize and evaluate sources and determine how sources inform, and are informed, by differing perspectives.

The following summarizes some of the functionings, capabilities, and capacities observed.

Capacities (Critical & Communicative): Engaging in multiple perspectives, strategically collaborating

To encourage a culture of strategic collaboration, Ms P begins the unit by creating community between and among the new groups she has established. After short banter, she asks her students

to imagine "how many times in the 20th Century has the US been involved in armed conflict?" The students offer guesses ranging from 15 times to 387 times. Before they research the answer, Ms P asks her students to justify their responses. Students offer explanations tied to economic, strategic/geographic, political and humanitarian interests. One student offers the explanation, "We think of ourselves as the world police." When Ms P asks why, he responds, "After World War II, we were the only remaining democratic superpower; we felt threatened; we had to spread our influence." As the students offer reasons, Ms P captures them on a graphic organizer on the whiteboard as the students take notes.

Over the course of their reading of and engagement with *Overthrow*, students are arranged in jigsaw book groups in which each group member has been assigned one of three different sections: Imperialism, Covert Actions, or Invasions. The students read their assigned section and "teach" the content and themes to other members. A reading quiz on the entire book is given as a formative assessment and as a way to hold accountable each student for his respective section of the book. During this experience, students demonstrate lively engagement and mutual respect as they offer viewpoints, challenge perspectives, and share resources that either support or refute positions on various topics.

Students must also keep a reading journal called a "Playbook" in which they reflect on and question what they have read in their respective section as well as respond to the comments and information shared by their fellow group members based on different sections of the book. Ms P shares a chart to model how each lens (Invasion, Covert Action, and Imperialism) can be charted and analyzed as the students add more information. Students record their charts of comments and questions in a group Google Doc that is shared with the entire class. Topics range from the US occupation in Panama; its conflicts with Cuba, Nicaragua; and its involvement in Guatemala, among others. Ms P asks her students to analyze each chapter and to compare their analyses with prior chapters using new information gleaned from their book group members. In all cases, she questions whether author bias plays a role in how students have come to understand each context. Here, as a strong example of strategic collaboration, students must depend on one another for information from different sections of the book and from shared writing and research.

Capabilities (Critical): Questioning
In one observed lesson, students lead book-talks in their groups and research different perspectives. During their discussions, Ms P visits each group and pushes them to own their learning and share it in ways that reveal new perspectives and insights. There are breaks in-between the research in which students discuss with their groups, annotate sources, and then share on Google docs and with the groups. Once again, Ms P has created a culture of healthy skepticism and mutual respect so that students challenge one another as scholars, not as adversaries.

In a way, the entire unit asks students to continuously question their own national identity through multiple lenses and sources. Ms P encourages her students to think about whether the points they make are from the author's viewpoint or from another perspective, and how the author selects his material or crafts his arguments. She wants her students to distinguish the author's point of view from their own opinions and arguments.

Functionings (Critical): Synthesizing and Analyzing:
After a series of group engagements with 20th Century contexts, Ms P asks her students to annotate a speech by President Obama to an audience of European youth in 2013 and to discern his foreign policy agenda from that speech. The purpose of this task is not only to experience how to analyze primary source documents but also to understand more deeply the complex factors that shape individual country foreign policy. Ms P explains that she wants her students to question US policies and to understand how they are just, not just accept them as a distant reality.

A final, expository narrative essay is assigned to the class directing them to imagine a current foreign conflict that involves the US and explain the rationale behind US intervention. While each student will write his own paper, the class is divided into groups so that students can both share sources and ideas and at the same time support one another as writers. As the students conduct research on their laptops, focused on their particular area of US involvement, Ms P walks around the room, pushing her students to understand US motives for various actions. "Why," she asks one group, "did the US go into Iraq? Why does it matter that you examine primary sources for all the people/parties involved in that decision?"

Ms P creates a community of "healthy skeptics" who respect the underpinnings of US foreign policy but also question it and how it is framed by historians, journalists and politicians. By learning how to use multiple sources to triangulate historical recordings and analyses, students learn both critical and analytical thinking skills as well as how important multiple perspectives are in shaping our views of the world and our own ideas of national identity.

Name of teacher: Ms D
Subject: Science (Chemistry)
Topic: Reaction Rates
Level: Grade Ten (Secondary 4)
Dates observed: March to April 2014
Report by Deb Sawch
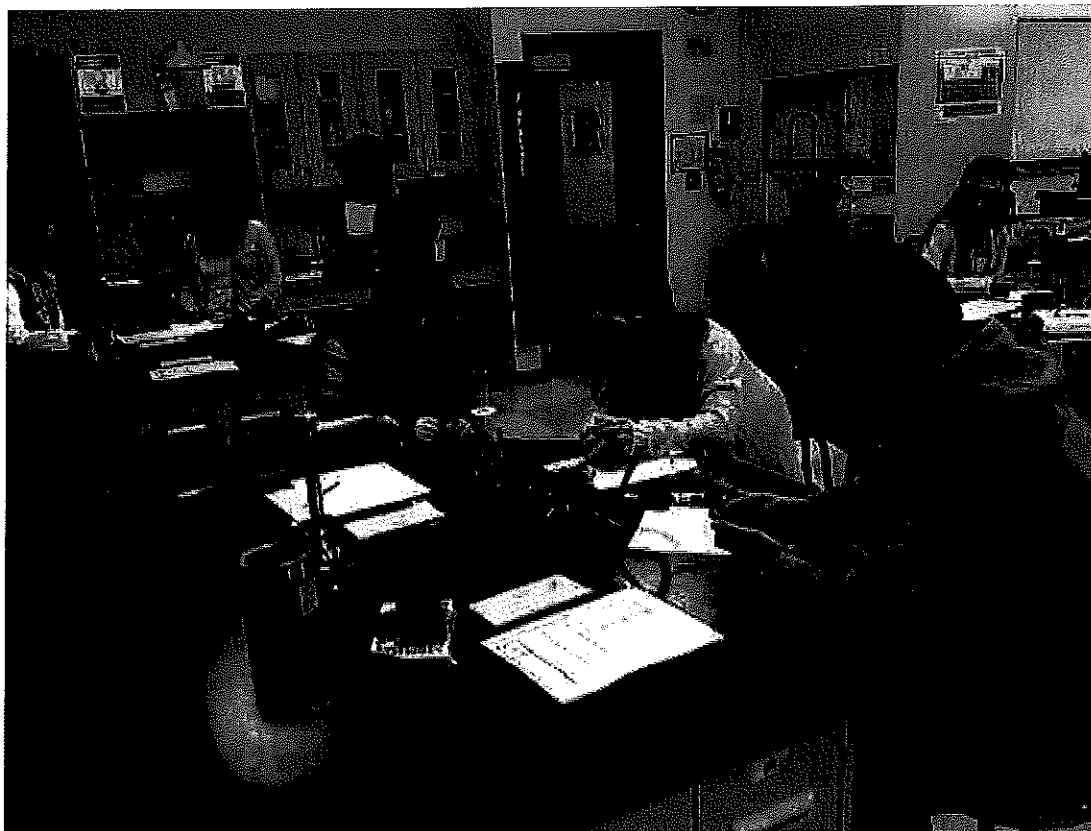
Introduction

This is Ms D's second year of teaching, and she has embraced the spirit and values of the Westport 2025 initiative, explaining that cultivating critical, creative and global thinking in her students and mastery of scientific content are not mutually exclusive goals. While all of her units include collaborative investigative teams, she describes how she wants this unit to incorporate more elements of simulation and realworld problem solving. Reaction rates, she insists, are not learned only by measuring or timing what happens in a test tube. Rather, reaction rates have implications in the real world, and her students need to know this.

To that end, this unit incorporates: 1) laboratory exercises and observations to both predict, analyze data, and time and measure the reaction of various materials in different contexts; 2) formative assessments that encourage game play and team work, and; 3) a collaborative

simulation task that asks students to serve as scientific advisors to an arctic climbing company and to apply concepts of equilibrium to a realworld challenge.

While the unit ends with a summative paper and pencil test, it also includes three other major assessments: two labs – Reaction Rate Lab and the LeChatelier Lab – as well as a "Hypoxia Performance Task" which requires students to design an experiment to investigate a realworld problem.

The essential questions that drive the unit are content-driven, and Ms D explains that it is in the execution of the unit, as students attempt to answer these questions, that the dispositions and thinking capacities of the district's 2025 lens will emerge:

- What causes a reaction to speed up or slow down?
- Why are all reactions not spontaneous?
- How can you manipulate a reaction in order to create the desired products?
- How does the free energy of a reaction impact the overall reaction?

Specifically, Ms D explains that she focuses on ways for students "to get out of their seats, bounce off ideas with one another." She wants to steer away from lectures and notes and "put more responsibility on my students for their own learning." To achieve this, her lessons are a mix of spontaneous group work, collaborative quizzes and assessments, simulation exercises, and practical labs. Ms D also explains that all planning for her units is done collaboratively with her fellow chemistry teachers so that she models the very dispositions of strategic collaboration, questioning, and curiosity that she expects in her students. That said, she wishes she could collaborate more with teachers outside of her department to explore possibilities of evolving her pedagogy so that it is more globally focused and more about realworld problem-solving.

The following summarizes some of the functionings, capabilities, capacities observed.

Functionings (Critical & Creative): Analyzing, simulating
Ms D explains that during this unit, it is essential that the students understand how to calculate reaction rates under different conditions and when and how materials that react reach equilibrium. Prior to the first lab, Ms D spends several days reviewing formulas with her students and asking them to make predictions under different scenarios. The students often work in informal groups, huddling together with those around them to solve textbook or worksheet problems and to predict and/or explain how and why certain reactions happen. Group work is student-run. Ms D walks around the room to each group and asks questions such as "Why do you think that would happen?" "What if it were colder?" "What do you notice?"

Prior to a class demonstration in the beginning of the unit, Ms D asks students to create a formula for the combustion of methane gas. The kinesthetic emphasis encourages students to apply procedures of testing, observation and discussion. Students have to explain the principles of equilibrium that they witness in the demonstration and work in groups to answer questions such as: "If a catalyst can change the rate of a reaction, why does it not disturb equilibrium?" In the first unit demonstration, Ms D holds onto a stick with a tower of bubbles, a student lights the bubbles with a match. The bubbles explode into flames, and the students react with awe and wonder. "How come the bubbles that remain intact are not combusting?" she asks her students. One student responds that they don't' have enough energy to combust. Ms D responds that reactions don't always happen spontaneously; in many cases, you have to do something to cause combustion.

Ms D then places the students into groups of four or five and assigns them to four different lab stations which have been set up to offer different conditions/stresses that affect equilibrium: e.g., heat, cold, acid, etc. As the students complete the lab, they are also asked to work together to envision real-life scenarios and to explain, in writing, phenomena related to equilibrium. These scenarios include:

1. The invention of refrigerators in 1913 greatly improved the quality of life for many people. Prior to this invention, food spoiled at a much faster rate, explain why food lasts longer when stored in the refrigerator

2. Cars pollute the air, and clear-air laws have made catalytic converters a legal requirement in the US b/c they convert harmful pollutants from an engine's exhaust into cleaner emissions. What would happen if an inhibitor were placed into the catalytic converter of a vehicle?

3. Antacid tablets are used for treating heartburn because they neutralize stomach acid. If a patient has extremely uncomfortable pain from heartburn, the doctor will suggest taking two antacid tables instead of one. Why would this be helpful to the patient?

4. Explosions in coalmines are a real hazard of the job because coal is a hydrocarbon, and is therefore combustible with O2. Coal miners know that an explosion is more likely form coal dust than solid coal. As a result, they are very careful to keep coal dust out of their houses. Why is coal dust more dangerous than solid coal?

Capabilities (Creative): Following one's curiosity; Functionings (Communicative): Strategic collaboration
Prior to the lab on Le Chatelier's principle ("When a stress is applied to a chemical system at equilibrium, the equilibrium concentrations will shift in a direction that reduces the effect of the stress"), Ms D shares that she wants her students to be agents of their learning, so she assigns the

students into groups of three and asks each member to learn about a particular stress factor—pressure, temperature or concentration—and to teach it to the other group members. As she provides directions to the class, Ms D directs her students: "I want you to explain [to your group mates] what it is that you learned; I want to hear you explain it and piece together what you meant; when you become an expert on your factor, your group will become an expert, too."

The lab itself is conducted in a jigsaw style teaching/learning strategy where each member of a group goes to a different station to learn deeply about one aspect of equilibrium that he/she will teach to the group after the learning session is over. The students are engaged in conversation and questioning; they wonder aloud about different scenarios and are respectful of one another in their groups. As Ms D moves around the room, she asks them different scenarios to make sure students grasp the concept.

Capacities (Critical): Engaging in realworld problem solving
In this next lab, which is new to the unit and directly aligned the concept that drives Le Chatelier's principle, students work in small groups to conduct research as part of a consulting company hired to advise a group of mountain climbers about best ways to address hypoxia (altitude sickness). Students are given laptops and are asked to research hypoxia and then to design a series of scientific experiments that would allow students to test for hypoxic symptoms in mountain climbers in various stages of their climb. They are asked to write a letter of recommendation to the mountaineers advising them of best ways to address hypoxia given their experiments on how different stresses affect equilibrium. This task, which involves independent research and group collaboration, helps students to apply Le Chatelier's principle to a realworld setting. It also requires students to advocate for their positions via a formal, written argument.

Functionings (Critical): Synthesizing and analyzing
Because this is only a two-week unit, Ms D uses formative assessments throughout the unit to gauge understanding of reaction rates, entropy, spontaneous reactions, reversible reactions, etc. in advance of the labs that the students will conduct. On the day before the final assessment—a formal exam--she begins class with "The Chemistry Jeopardy Game,"--a version of the American game show in which contestants are provided answers to increasingly difficult questions across a wide range of categories and where they must provide the appropriate question that aligns with the answer. The difficulty of the question is rewarded with increasing points. The purpose of this interactive, collaborative game is to ensure students have grasped and can apply the concepts of the unit. Further, as Ms D explains, the game show is intended as a formative assessment that both tests for complex levels of analytical thinking and helps cultivate the spirit of teamwork and excitement about the concepts of rates and reactions. Lower-level questions focus more on procedural protocols, while higher-level questions provide contexts for applications:

Chemistry Jeopardy:

400-Level Question:

$3H_{2(g)} + N_{2(g)} \Leftrightarrow 2NH_{3(g)} + Heat$
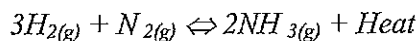
At equilibrium this reaction favors the production of ammonia, if I added a catalyst to the reaction the new equilibrium position would favor this side because...

500-Level Question:

$2SO_{3(g)} \Leftrightarrow 2SO_{2(g)} + O_{2(g)}$
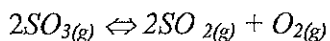
4.00 moles of SO_2 and 5.00 moles O_2 are present in a 2.00 L container at 100 degree Celsius and are at equilibrium. Calculate the equilibrium concentration of SO_3 and the number of moles $SO3$ present if the $Keq = 1.47 \times 10^{-3}$

Capabilities (Critical): Agency in learning

Overall, this unit both reflects and cultivates in students key global capacities of critical thinking, creative thinking and communications thinking with less emphasis on global thinking. All forms of thinking are visible through lab and group work, as well as reflection journals that the students keep throughout the lessons. On-going efforts by Ms D to encourage her students to become agents of their own learning present themselves in open-ended challenges (the mountain climbing simulations exercise) and in jigsaw approaches to labs (The LeChatelier Lab).

Name of teacher: Ms W
Subject: Math
Topic: Algebra-Polynomials
Level: Grade 9 (Secondary Three)
Dates observed: March to April 2014
Report by Deb Sawch
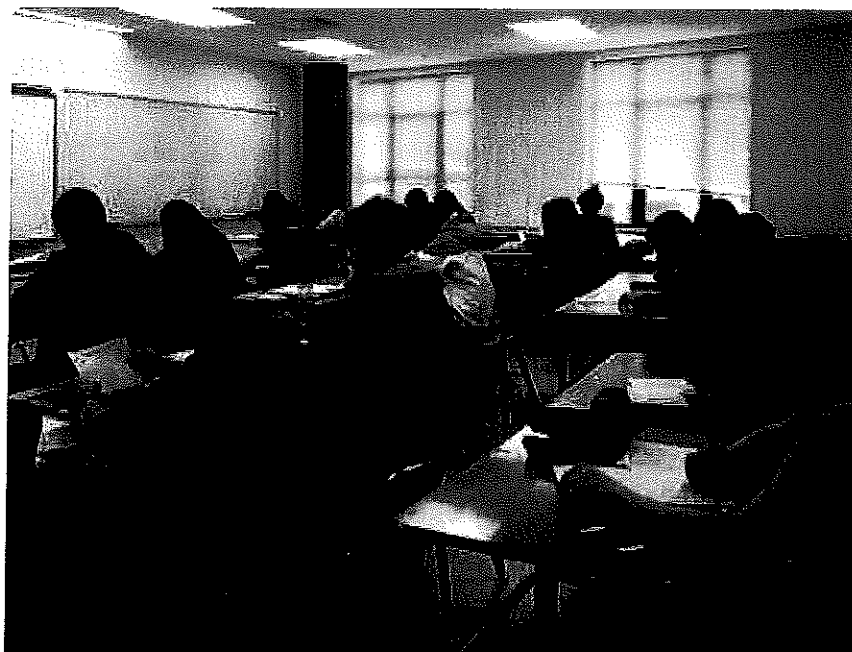
Introduction

Ms W, who has been teaching math in the school since 2000, also teaches French, and it is her experience-based belief in interdisciplinary thinking and in cultivating a global mindset that compelled her to join the district's 2025 Task Force and to re-envision her pedagogical approaches. She believes that the more students internalize math concepts, as opposed to master problem sets, the more they will be able to adapt to new contexts and fully engage in and with the real problems of the world. She explains that she wants her students to look beyond an equation and envision the concept that drives it.

According to Ms W, one of the goals of this unit on polynomials is to have students not only look at data and analyze it using the right equations, but more importantly, for students to gather data on their own and determine which mathematical model best fits the data and why. In the past, her unit began with the basic concept and mechanics of quadratics – including one day reserved for finding the line of best fit – accompanied by textbook exercises that provided scenarios to help students learn how to manipulate data using quadratics in order to solve problem sets. Often these problems explicitly indicated whether to use quadratic, quartic or cubic

equations. It was only in the last two days of the unit that Ms W would introduce realworld applications using "clean" data sets that perfectly fit the models.

But this year, as part of her work in the 2025 initiative, Ms W decides to "lensify" the process and uses the 2025 lens to identify key global capacities she wants to privilege in the unit as well as to "go global"— to weave realworld data throughout the unit, from beginning to end, and to create ambiguous, non-standard problem sets that, she suggests, not only compel her students to think more deeply in ways they had not before, but that also more accurately reflect what will be expected of many of her students in their jobs and careers.

The following summarizes some of the functionings, capabilities, capacities observed.

Functionings (Critical): Analyzing;
Capabilities (Critical): Discovering;
Capacities (Critical): Understanding realworld issues
The unit now begins with realworld data that has not been "cleansed" to fit neatly into an equation or within a pre-determined model. Students use prior, basic knowledge of quadratics to create models to determine line of best fit. In some cases, students will need to "discover" that a quadratic will not work, so they must try a cubic or quartic regression instead. They are asked to "play the teacher" and look at examples of equations that were incorrectly solved by students, and then to suggest where conceptual misunderstandings may have led to error. When they are comfortable with the different formulae for regressions, they examine graphs already plotted and use their understanding of regression to suggest the kind of scenarios that would populate the data in the graph (i.e. weather patterns, seasonality of home sales, gas prices, etc.). See example on the next page.

Ms W explains that in the past, students did not understand the importance of model- making because they only worked with the finished product: "Using realworld data forced the kids to look more closely at their data, and it was cool to listen to the kids and hear their ideas; and then we brought back realworld data from the CDC (Center for Disease Control) for teen pregnancy, and we talked about real world connections to it, and that's what these kids are going to have to do in their jobs—look at real data."

Part 2: What real-life scenarios might be represented by the graphs below? Label the axes with words and/or appropriate numbers. Don't be afraid to be creative and think outside the box!
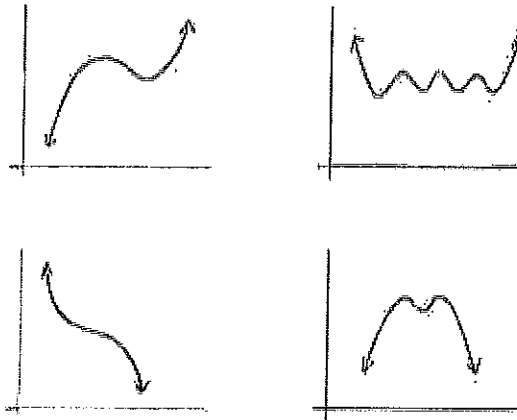
Plan 3: You work for the CDC. Teen pregnancy rates have followed a perplexing pattern since 1970. You and your team of analysts have been asked to take a look at the data and create a model to help the CDC predict teen pregnancy rates into the future. (Birth rates are births per 1000 women)

Xi	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	00	02	04	06	08	10
Rate																					

1) Create a model to fit the data above. Explain your rationale for the model you created. _____

Capabilities (Critical): Questioning

Ms W believes her students need to be comfortable with ambiguity, and she provides a safe space in which students can talk through and "play with" the data sets. As a matter of practice, Ms W includes time for pair/share discussions and group discussions, and she has arranged the desks in her class into pairs so that students can easily work with a partner or in sets of fours to work through problems, make predictions, or help with misunderstandings. She also allows for what she calls "math fights"— moments during class for students to openly disagree about solutions, predictions, or problem-solving processes and render their thinking more visible.

Functionings (Communicative): Communicating through multimodal texts

Ms W also welcomes technology into her classroom. She uses a Smartboard exclusively, which includes a graphing calculator function that allows her and her students to demonstrate each step of problem-solving and to plot data easily. All class work recorded on the Smartboard is saved and immediately downloaded into the class online repository so that students can review problem-solving steps and class notes both in class and when doing homework. All students own their own graphing calculator, and many use their own laptops and iPads to access websites during class.

Functionings (Critical): Observing

Throughout the four lessons observed, Ms W regularly uses words and phrases such as "What do you notice?" "What's the purpose of making a model?"; and "What's different?" and encourages role-play so that students act as researchers to manipulate models. In an early unit lesson, Ms W hands out data from the CDC in a document titled "The CDC's Dilemma" which features a simulation of a disease with data from 1996-2009 in which students must simulate that they are part of a research team who must study the global spread of the disease and make predictions. Students work alone to plot the data into their calculators and then work in pairs to determine the best model to analyze and predict. Ms W asks, "Do you trust it? Would you go to your boss at the CDC and say you found the model that works?" As evidenced by squirms and mumbles, the students are not confident of their models yet, so they are given opportunities to go back to different modeling options and try different scenarios.

Capacities (Critical): Tolerating ambiguity

By the end of the unit, in addition to a final pencil and paper test, the students are challenged to find their own data sets to determine which model works best, makes sense, and fits. Here is where Ms W finds clear evidence of deep analytical thinking skills and her students' ability to work through ambiguity and make realworld applications. During their "data hunt," the students access websites that are too unwieldy (e.g. the CDC) or have insufficient information, but then turn to more generative sites, such as those for The World Bank and The United Nations. They must sift through the data, find "good/bad" data, and pick a model that they will use to analyze it. They also present their models, and the thinking behind them, to the class. Ms W admits that her students "could never do this in the past, partly because I never asked them to do it before!" She wants them to understand that an equation "came from somewhere and has a purpose, and that models are used for making predictions all the time in real life." She sees through their work throughout the unit that "they have a much better feel for where these models come from and what their purpose is."

In fact, Ms W explains that next year, she may use these sites to start off the unit because they represent the kind of Big Data approaches that her students may need to master in their future careers. As she puts it, "This will keep them globally competitive—understanding how Big Data fits into everything."

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HANDOUTS WILL BE AVAILABLE

MONDAY NIGHT

WESTPORT PUBLIC SCHOOLS

ELLIOTT LANDON
Superintendent of Schools

110 MYRTLE AVENUE
WESTPORT, CONNECTICUT 06880
TELEPHONE: (203) 341-1010
FAX: (203) 341-1029

To: Members of the Board of Education

From: Elliott Landon

Subject: Student and Faculty Calendar/2017-18 School Year

Date: March 14, 2016

As has been our practice, the Board of Education discusses and approves a student and faculty calendar two years in advance of implementation. It will be necessary, therefore, for the Board to consider and approve a student and faculty calendar for the 2017-18 school year.

At our last Board of Education meeting held on February 29, members of the Board asked me to research options so that we could create a full week February recess while meeting the requirements of the Regional Uniform School Calendar that was mandated by the Connecticut State Legislature. As you will recall, the essential components for the State-mandated calendar are as follows:

1. At least 180 days of actual school sessions during each school year (The Westport Public Schools require students to be in attendance for 182 days).
2. A uniform start date as determined by Cooperative Educational Services.
3. Uniform days for professional development and in-service training for certified employees (The Cooperative Educational Services uniform regional calendar includes 2 such days; the Westport Public Schools require 6 of these days for its certified employees).
4. Not more than 3 uniform school vacation periods during each school year, not more than two of which shall be a one week school vacation period and one of which shall be during the summer.

With these guidelines determining the nature of our 2017-18 school calendar, a calendar has been prepared that is consistent in every way with the essential components required in the "Uniform School Calendar" adopted by Cooperative Educational Services, but also provides for the nuances required by the Westport Board of Education, as follows:

1. 182 days of actual school sessions for students (Same as the uniform calendar plus 2).
2. 6 staff development days for certified employees (Same as uniform calendar plus 4).
3. One week vacation in December; one week vacation in April (Same as uniform calendar).

Following discussions with various individuals at the State level, it appears that the limitation on two weeks of vacation during the school year applies *only* to weeks without any holidays in them. Therefore, since the week beginning February 19, 2017 is not a full week as it begins with the legal holiday designated as President's Day, it is my recommendation that the Board of Education adopt a 2017-18 calendar for students and staff that permits the closing of school during the week beginning President's Day.

I have prepared for the Board's consideration and approval the calendar that appears as an attachment to this memorandum.

ADMINISTRATIVE RECOMMENDATION

Be It Resolved, That upon the recommendation of the Superintendent of Schools, the Board of Education approves the school calendar for the 2017-18 school year that is dated March 14, 2016 and is appended to the Minutes of the Meeting of March 14, 2016.

WESTPORT PUBLIC SCHOOLS
SCHOOL CALENDAR 2017-2018
MARCH 14, 2016

JULY 2017   (0)

S	M	T	W	Th	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

4 Independence Day

AUGUST 2017   (1)

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	*28	*29	*30	(31)		

*28-30 Staff Dev. Days
(31) Students' First Day

September 2017   (19)

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

4 Labor Day
(21) Rosh Hashanah

October 2017   (22)

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November 2017   (19)

S	M	T	W	Th	F	S
			1	2	3	4
5	6	*7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

7 Election Day/*Staff Development Day
   No School Students
22 Shortened Day
23-24 Thanksgiving Recess

December 2017   (16)

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

25-29 Holiday Recess

January 2018   (20)

S	M	T	W	Th	F	S
	1	2	3	4	5	6
7	8	9	10	11	*12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

1 New Years Day
*12 Staff Development Day
   No School Students
15 Martin Luther King Day

February 2018   (14)

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	*26	27	28			

19-23 Winter Recess
19 Presidents' Day
*26 Staff Development Day
   No School Students

March 2018   (21)

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

30 Good Friday

April 2018   (16)

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

9-13 Spring Vacation

May 2018   (22)

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

28 Memorial Day

June 2018   (12)

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

18 Students' Last Day/Graduation Day
   Shortened Day for Students Only

Students - 182 days   *Teachers - 188 days

Staff Development Days: August 28-30, November 7, January 12 and February 26
Students'/Teachers' Last Day will be June 18. Snow/Emergency School Closing Days will be added after June 18.
If there are no snow/emergency days, Students'/Teachers Last Day will be June 18.