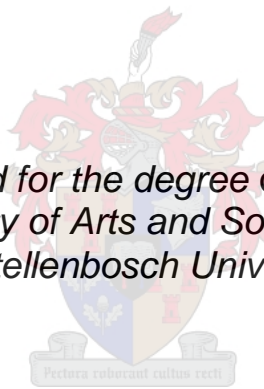# Future-Focussed Music Education: Developing 21st-Century Competencies in a South African Middle School Music Classroom

by
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*Dissertation presented for the degree of Doctor of Philosophy
in the Faculty of Arts and Social Sciences
at Stellenbosch University*

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March/April 2021

Declaration

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

March/April 2021

Abstract

Educators world-wide find themselves in the challenging position of educating young adolescents for a future in which exponential knowledge doubling will become a reality. Together with the medical prognosis of a much longer life span for this age group and a radical restructuring of the global economy, the implication is that today's youth will need the skills to negotiate a much longer career of self-employment through a succession of jobs, often collaborative in nature and mostly Internet-driven. These factors have triggered a shift, worldwide, from a knowledge-based school curriculum to a competency-based curriculum.

Using a constructivist and humanistic theoretical framework, this dissertation explores the impact that a competency-based music curriculum could make in the development of the 21st-century competencies that students will need to thrive in the workplace of the future. It also investigates which pedagogical methods could be most effective in developing these competencies, what types of feedback students might find most effective, how an explicit focus on 21st-century competencies can assist students in their development of these skills, and which of the competencies developed through music can be transferred into other learning areas.

An extensive literature review that identified the most pertinent set of 21st-century competencies is followed by a detailed description and evaluation of a teacher-based case study I conducted in a Johannesburg private school music class consisting of 23 students aged 12-13 years. I designed a year-long class music course using L Dee Fink's taxonomy of significant learning (2003) and collected data through rubric-based observations, student self-assessments, and focus groups. This data, collected over four research cycles and a final assessment, was collated into competency profile maps that illustrate the growth and development of the competencies.

The main finding is that an explicit focus on 21st-century competencies in a music curriculum, in conjunction with the pedagogical methods of project-based learning, gamification, and blended learning, have an uneven but positive impact on students' development of these competencies. A secondary finding is that such competency development through music can be adapted to other subjects, schools and locations. In an age of Covid-19, another significant finding is that teaching and assessment that is heavily Internet-based can be no less successful in music than in any traditional 'academic' subject.

Opsomming

Opvoeders bevind hulle wêreldwyd in die uitdagende posisie om jong adolessente op te voed vir 'n toekoms waarin eksponensiële verdubbeling van kennis 'n werklikheid sal word. Saam met die mediese prognose van 'n baie langer lewensduur vir hierdie ouderdomsgroep en 'n ingrypende herstrukturering van die wêreldekonomie, is die implikasie dat die jeug van vandag die vaardighede sal benodig om 'n veel langer loopbaan van selfwerksaamhede te onderhandel deur 'n opeenvolging van werksgeleenthede, dikwels samewerkend van aard en meestal internetgedrewe. Hierdie faktore het wêreldwyd 'n verskuiwing veroorsaak van 'n kennis-gebaseerde skoolkurrikulum na 'n vaardigheidsgebaseerde kurrikulum.

Aan die hand van 'n konstruktivistiese en humanistiese teoretiese raamwerk word hierdie verhandeling ondersoek ingestel na die impak wat 'n vaardigheidsgebaseerde musiekkurrikulum kan hê in die ontwikkeling van die 21ste-eeuse vaardighede wat studente nodig het om in die werkplek van die toekoms te kan gedy. Daar word ook ondersoek ingestel na watter pedagogiese metodes die doeltreffendste kan wees om hierdie vaardighede te ontwikkel, watter tipe terugvoer studente die beste kan vind, hoe 'n eksplisiete fokus op bevoegdhede in die 21ste eeu studente kan help met die ontwikkeling van hierdie vaardighede en watter vaardighede ontwikkel word. deur musiek na ander leerareas oorgedra kan word.

'N Uitgebreide literatuurstudie wat die belangrikste stel vaardighede in die 21ste eeu geïdentifiseer het, word gevolg deur 'n gedetailleerde beskrywing en evaluering van 'n onderwysstudie-gevallestudie wat ek gedoen het in 'n Johannesburgse privaatskolemusiekklas bestaande uit 23 studente van 12-13 jaar. Ek het 'n jaarlange klasmusiekkursus ontwerp met behulp van L Dee Fink se taksonomie van betekenisvolle leer (2003) en data versamel deur middel van rubrieksgebaseerde waarnemings, studentevaluasies en fokusgroepe. Hierdie data, wat oor vier navorsingsiklusse en 'n finale assessering versamel is, is saamgevoeg in kaarte vir bekwaamheidsprofiele wat die groei en ontwikkeling van die vaardighede illustreer.

Die belangrikste bevinding is dat 'n eksplisiete fokus op 21ste-eeuse vaardighede in 'n musiekkurrikulum, tesame met die pedagogiese metodes van projekgebaseerde leer, gamifikasie en gemengde leer, 'n oneweredige, maar positiewe impak op die studente se ontwikkeling van hierdie vaardighede het. 'N Sekondêre bevinding is dat sodanige

vaardigheidsontwikkeling deur musiek by ander vakke, skole en plekke aangepas kan word. In 'n era van Covid-19 is 'n ander belangrike bevinding dat onderrig en assessering wat sterk op die internet gebaseer is, nie minder suksesvol kan wees in musiek as in enige tradisionele 'akademiese' vak nie.

Acknowledgements

Writing this dissertation emphasised to me what a privilege it is to receive a music education, and I could not help but reflect on just how fortunate I was to have parents who sacrificed so much to provide me with the best education possible. From their enthusiasm for my earliest squeaks and squawks as a beginner recorder player, to their kind assistance as I finished my PhD nearly 30 years later, their support has been unwavering. I am eternally grateful to Jean and Nigel Mullins, and know that none of this would have been possible without them.

I would also like to offer my heartfelt thanks to my extended family for their love and support during the completion of this dissertation. I would like to particularly thank my uncle, Roger Wicks, for his financial assistance with my early music studies.

I have had the privilege of working with Prof. Christine Lucia since my first year of university in 2004 and could not have hoped for a better supervisor to see me through my PhD. Her wisdom, insightfulness, guidance and encouragement have been instrumental in my development as a researcher, a teacher and a person.

Thank you to Prof Stephanus Muller and the Africa Open team for embracing me and providing me with a home to complete my studies.

As I'm sure anyone reading this dissertation will see, I am incredibly fortunate to work in a school like Redhill that supports innovative education practices. Thank you to Joseph Gerassi for his leadership and support of this research, to Kemble Elliott for her guidance and mentorship, and to Adam Golding for his friendship and assistance.

Finally, I would like to thank my research participants and their families for their willingness to embrace the challenges of this course, share their learning processes, and reflect on their experiences so openly. It was such a joy to watch these 23 little people blossom and grow throughout this case study and they will always hold a special place in my heart.

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Chapter 1 – Exploring the Role of Music in 21st-century Education

Future Forecast

Educators, world-wide, find themselves in the challenging position of educating young adolescents for a future that is entirely unpredictable. This notion of "the unpredictable future", and how to prepare students for this, has been at the centre of my research for the past five years, and something that I had researched, written about, and spoken about at conferences. Despite my understanding of the volatile nature of the future, and the National Education Association's assertion that "Global warming, immigration reform, pandemic diseases, and financial meltdowns are just a few of the issues today's students will be called upon to address" (2012, 5) I did not expect such a violent and pervasive reminder of this as I wrote up this research in 2020. Just months after concluding the case study I will present in this dissertation, my students and I found ourselves forging new ways of interacting and communication with one another as we embarked on distance learning during the quarantine brought about by the Covid-19 pandemic, assuring me not only of how rapidly and significantly the world can change, but also of the importance of this research.

Unexpected global crises, like the Covid-19 pandemic, are not the only thing driving change. Global knowledge had already doubled each century up until the 20th century, and every 25 years during the 1900s (Buckminster-Fuller cited in Milicevic 2015, 1), and while it is estimated that we currently experience a doubling of knowledge every 13 months (Russell 2016, 41), it is anticipated that our global knowledge will eventually be doubling every 12 hours (Schilling 2013; see also Buckminster Fuller 1982, Milicevic 2015, Meige and Schmitt 2015).

Due to this exponential growth of global knowledge there has been a radical restructuring of the global economy. The Da Vinci Institute's senior futurist, Thomas Frey, estimates that by 2030 two billion jobs will be "automated out of existence" (Frey 2014). Economist, Stuart Elliott, concurred, publishing a pilot study that predicted that, based on current cutting-edge research in artificial intelligence, by 2030 computers could substitute for human abilities in occupations that currently employ 60 percent of the [US's] national workforce (in Jerald 2009, 6).

Automation does not just threaten blue-collar jobs such as factory assembly, but any job "where information can be digitized and key tasks can be broken down into a set of predictable rules" (Jerald 2009, 2). We may even "see entire occupations wiped out" (Walden cited in Lutton 2016).

The medical prognosis of a much longer life span for the students we currently educate (The World Health Report 1998) is another important factor to consider. Stanford University's age specialist Professor Stuart Kim predicts that the first person who will live to the age of 200 has already been born (cited in Taylor 2017); and The US Census Bureau's 2008 study projected that by 2030, nearly 20% of US residents will be 65 years and older. "In fact, the 65 and older population is expected to more than double between 2008 and 2050, while the 85 and older population is expected to more than triple" (Jerald 2009, 16). This means that the students we are currently educating will have far longer working lives. All this implies that today's youth will have to have the skills to negotiate a future career of self-employment through a succession of different kinds of work, often collaborative, mostly Internet-driven.The onus is on 21st-century educators, then, including music educators, to equip students for occupations and ways of working that do not yet exist.

A key theme emerging from recent studies of future-oriented learning and teaching is working with others: Bolstad et al advocate "restructur[ing] school activities so that learning can happen through collaborative knowledge building" (2012, 37); and in the field of music education it is suggested that "teachers and learners should engage together in a process of understanding life and the world [and collectively] take a critical stance toward every new datum before accepting it as knowledge" (Kokkidou 2013, 1-2). This new collaborative approach has triggered a shift, worldwide, from a knowledge-based curriculum to a competency-based curriculum (Dubois 1993, Daugherty et al. 2015, Colby 2017). I return to the idea of competency as a theoretical concept later, but for now I want to note that the competencies needed to meet the demands of the 21st century are different from even those skills that are at the forefront of today's curricula, as Ally Bull and Jane Gilbert have shown: "'Traditional' forms of education … are no longer appropriate … New approaches are needed if our young people are to develop the 'dispositions' (to knowledge, thinking, learning and work) needed to productively engage in the 21st century world" (2012, 4). This even applies, I suggest, to music. Reading and writing staff notation and playing an instrument are the main focus at school level. They make this a highly 'skills-based',

practical subject. This does not, however, automatically make it a 'competency based' subject without a decided paradigm shift in the way it is taught.

My PhD is not so much concerned with changing the way music is taught, but with making a paradigm shift through music, in line with what Bull and Gilbert call the "paradigm shift in international thinking about education" over the last 15 years, which is "driven by an awareness of the massive social, economic and technological changes (in kind, not just degree) taking place in the world outside education, and the exponential increase in human knowledge that has resulted from these changes" (2012, 4). My research project is inspired by this call for new approaches, not merely to music education but to education in general. More specifically I am interested in seeing how competencies can be developed through a 21st-century competency-based music curriculum in the South African Middle School music classroom. If the students I currently educate are going to succeed in the workplace of the future, they are in need of a significantly different set of skills than the ones the current curriculum provides for.

As I explain later (in Chapter 2), my school is an almost ideal environment in which to conduct an experiment in building 21st-century competencies through music education, and out of a case study there, a model may be constructed that could be applied elsewhere.

As a music teacher of almost 14 years, I have come to see the important role music can play in education. I have never encountered a student that did not engage with some form of music daily, whether through a choir or instrumental lessons, or by passive listening to radio, television, or video games. Indeed, Middle schoolers (aged 12 to 15) rely on music as a strong informing factor in their identity construction (de Nora 2000, 56). Music is a highly subjective, nuanced medium that promotes creativity, collaboration, and debate (Reimer 1989, Daugherty 1996, Kokkidou 2013). The Middle School is thus a perfect environment, and music the ideal medium, I argue, through which to explore and develop 21st-century competencies. My concern in this PhD is not with researching how to develop 21st-century competencies (hereafter abbreviated to '21CC') *in* music, but *through* music, and as such, belongs to a long tradition of research in 'education through music' that includes scholars such as Patricia Shehan Campbell (2004, 2008), Bennett Reimer (1989), and David Elliott (1995, 2005).

I do not believe that this is an either/or situation, where we have to choose between developing our students' 21st-century competencies rather than their musical ability or vice versa. David Elliott and Marissa Silverman remind us that "music is conceptually, culturally, emotionally, and politically complex" (2015), and as such, is a perfect medium through which to develop 21st-century competencies. Similarly, students who are critically engaged, curious and creative will undoubtedly make for better musicians. I have been interested in pedagogy that could support 21st-century competency development for the past five years and have begun to see the impact this approach could have on my students if it were implemented and assessed systematically.

A great deal of research on 21CC already exists, and the P21 partnership for "21st Century Learning" network (P21 2009) offers a variety of resources, frameworks, definitions, guides and exemplars for researchers. Some recent articles dealing with 21CC include Kong et al. (2014) on the link between domain knowledge and 21CC; Scardamalia and Bereiter's (2014) study on the importance of the competency of innovation in schools and society; Reimers' (2009) study of the effects that the development of global citizenship could have on major problems such as terrorism and global warming; the role of project-based-learning (PBL) in the development of 21CC (Bell 2010); and the necessity of 21CC in decoding the new metalanguages that are arising out of a technology-driven society (Kist 2003). Recent doctoral level research on 21CC has been conducted by Serdar (2015), Bashir (2013) and Sharick (2016), amongst others. Although these dissertations deal with educational leadership, online studies, and the role of technology in 21CC development respectively, they all use a case study methodology, and therefore also illustrate the benefits and limitations of this methodology in researching 21CC.

21st-century Competency Development in Music

When presenting papers to the South African Society for Research in Music (SASRIM) and the Pan-African Society for Music Education (PASMAE) in 2016, I realised that most music teachers in South Africa are only superficially aware of 21CC, perhaps not surprisingly, since music educators worldwide have often "fail[ed] to keep pace with the changing needs and interests of 21st century learners" (Kaschub and Smith 2014, 1). In the literature on music education in South Africa (see for example De Villiers 2012, 2015, Herbst 2003, Harrop-Allin 2010, 2014, 2015) I have found little mention of the topic, and even internationally it is thin (see Mark and Madura 2009 and 2013, Elliot 2005, Campbell

2004 and 2008), yet it could nevertheless have a major impact on students, and by extension, on society and even the economy.

South African education policy documents have begun to engage with 21CC terminology. The Western Cape Education Department's 'Grade 7 Arts and Culture Learning Outcomes'[1], for example, include creating, interpreting, presenting, reflecting, participating, collaborating, expressing and communicating (2002), however I find the way in which these "learning outcomes" are defined, and are expected to be demonstrated, problematic. According to 21CC literature (Buckley 2017, Bull and Gilbert 2012, Daugherty et al 2015, Gilbert 2016, Pellegrino and Hilton 2012), reflection involves the careful contemplation of one's own experiences of learning and understanding, which goes much further than the policy document's idea of reflection, which is by "classif[ying] African instruments in terms of ideophones, chordophones, membranophones, aerophones, and Western instruments according to strings, woodwinds, brass and percussion" (Western Cape Education Department 2002). In my readings of South African education policy documents and literature, in short, I have found that the treatment of 21CC in arts education is at present fairly cursory, and I hope to address this through my research.

The limited research on 21CC development through music in other countries includes articles and policy documents that explore the alignment between current education models (Common Core State Standards, National Assessment of Education Progress, National Standards for Arts Education) and 21CC frameworks (Charleroy et al. 2011, Gilbert 2016). Maneen's doctoral dissertation (2016) investigates teacher perceptions of arts integration practices in developing the four competencies of communication, collaboration, critical thinking and creativity, by interviewing nine teachers (of various subjects and grades from kindergarten to eighth grade i.e. 14-year-olds) in order to generate data that illustrates that an integrated arts programme had a positive influence on 21CC development. My aim was not to work with other teachers, however, but to work with my own class of students and in this respect, Leonard Tan's (2017) ethnographic study, that explores the development of 21CC in a secondary school band in Singapore through music performance, was the most useful starting point for my study. My methodology differs from Tan's – it is a case study rather than an ethnography – and although similarly rich in description of the ways in which 21CC can be developed through music, my study is larger. It involved practical, theoretical and historical aspects of music

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[1] This document divides the CAPS topics (see page 25) into learning outcomes that include 21CC terminology.

making in the classroom and not just practical, as Tan's does, and it involved a more focussed age group.

Most music education research in South Africa, according to the 2018 list of dissertations online (National ETD Portal) has, understandably, been more concerned with confronting the challenges of integrating indigenous musics into the curriculum (Nevhutanda 2010, Nkosi 2014, Harrop-Allin 2010, McConnachie 2017, Mitas 2015, Mangiagalli 2005, Magalane 2017), but while this topic is important, I believe that a different approach is needed, not *to* music education but *through* it, in order to indirectly address underlying economic and societal problems. I believe that my research could address the ideas of 21CC development in such a way that it could be beneficial in both local and international forums.

The competency-based curriculum I envisaged developing during my research relied heavily on student-driven learning, with the student having the opportunity to curate their own content and critically interrogate 'given' information. Students were taught to be innovative and creative; productive and adaptable; global and digital citizens with the ability to communicate and collaborate across geographical and cultural boundaries. For a shift away from knowledge to competency is also a shift away from material resources to human resources, and from analogue to digital technologies. It is my hope that this research project will not only fill a gap in the literature on the development of 21CC in the middle school music classroom, but also have far-reaching consequences for arts and humanities education in South Africa.

Research Goals

The primary problem my class-based research addressed was whether the design and implementation of a competency-based music curriculum implemented in the Grade 7 Music Classroom, in a private Middle School in Johannesburg for two semesters (2019), can show that music is a suitable vehicle through which to develop 21CC. Building upon previous research, I conducted a case study that used a cyclical or iterative research structure. I wanted to assess how various pedagogies and assessment methods could be used within an integrated class music curriculum. My goal was to provide the music education community with practical examples from this research that they could adapt to their school or class, and to provide the broader educational community with another model for further development in research on 21CC.

The main research questions I asked in order to address this problem were:

1. Which of the 21CC (as identified in the Theoretical Points of Departure below) can effectively be developed through music?
2. Which pedagogical methods are most effective in developing 21CC through music?
3. What types of feedback and guidance do the students and I find most effective in improving their 21CC?
4. Does an explicit focus on the development of 21CC assist in, or detract from, the development of these 21CC?
5. Which 21CC that are developed in the music class, do the students feel they can transfer to other learning areas? By extension, the whole research project also asks which ones can be transferred to other South African or global music classrooms.

These five questions cover issues relating to (1) 21st-century competencies, (2) pedagogy, (3) pedagogy and assessment, (4) awareness, and (5) transferability, issues to which I shall return throughout the dissertation.

Theoretical Points of Departure

My teaching practices, and by extension, this research is firmly rooted in constructivist education theory. The constructivist views – that children assimilate and accommodate new knowledge as they interact with their physical environment (Piaget 1969), that learning occurs through collaboration and social interaction (Vygotsky 1978), that knowledge should not be passively received, but rather constructed by the learner (Von Glaserfeld 1995), and that students should be provided with opportunities to build and reflect upon their own knowledge (Bruner 1990) – have not only informed the way that I approach my classes and construct my curriculum, but also how I frame this research.

Jones and Brader-Araje remind us that

> Constructivism offers teachers instructional approaches that are congruent with current research on learning. By viewing learning as an active process, taking students prior knowledge into consideration, building on preconceptions, and eliciting cognitive conflict, teachers can design instruction that goes beyond rote learning to meaningful learning that is more likely to lead to deeper, longer lasting understandings (2002,4).

This notion, as well as the idea that knowledge is a process, not a product (ibid, 3), were central motivators in the construction of my project-based curriculum, which I explain in Chapter 2.

Two of Vygotsky's theories were particularly important in this study. Firstly, Vygotsky's Zone of Proximal Development, which he defined as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978, 86), served as a model in the construction and analysis of lessons in this study. Secondly, Vygotsky's concept development theory (1981) also informed large portions of this study. Vygotsky identified three stages of concept development in which, as Elliott describes, students are initially only able to form "syncretic conglomerations… [that are] idiosyncratic, accidental, and based on everyday observations" (2014, 13). In the second stage of concept development, students are able to formulate pseudo-concepts, where they are "still locked into a concrete understanding of the idea" (Ibid, 14). The third and final stage occurs when the student is able to generate a "scientific concept" where the concept can be understood in isolation and in abstract form (ibid). Students were expected to deal with a number of concepts throughout this study, and Vygotsky's theory of concept development was used to engage with the process students used to understand and define the new musical terminology they encountered.

Charmaz points out the methodological implications of a constructivist approach, noting that researchers should take a "reflexive stance toward the research process and products" (2006, 131), acknowledging that "both data and analyses are social constructions that reflect what their production entailed" (ibid). Hershberg explains that "this means that researchers must locate themselves in the realities they are studying, examining how their interpretive frames, life histories and interests and the research context influence their actions throughout" (2014, 185). As I was both teacher and researcher in the study (see page 16), the relationship between the students and I was an important aspect of this research and something that I reflected on throuhougt the case study and interpretive work that followed.

Other theorists that have informed this research are from the late 20th- to early 21st-century school of humanistic education, which is "largely based upon constructivist theories of learning" (Salvin cited in Herman 1995, 8). One of the founding fathers of

humanistic education, Carl Rogers, advocates for experiential learning where students work in "cooperative groups" (1969, 242) and moves "away from the teacher as a source of all knowledge" (ibid). In this sense, both constructivist and humanistic education hold that "active rather than passive involvement on the part of the learner promotes meaningful learning" (Herman 1995, 12). In *Freedom to Learn* (1969) Rogers coined the term 'changingness' in arguing that "the goal of education, if we are to survive, is the facilitation of change and learning" because "no knowledge is secure [and] only the process of seeking knowledge gives a basis for security. Changingness, reliance on process rather than upon static knowledge, is the only thing that makes any sense as a goal for education in the modern world" (Rogers 1969, 104). Though first published in 1969, this idea is strongly aligned with the 21st-century education theory presented in the introduction of this chapter.

Although the late 2010s and early 2020s are very different from the 1960s, Rogers' core ideas are nevertheless compatible with the notions of competencies and dispositions with which I am concerned. I thus drew on his five core elements of experiential learning (Rogers 1969, reproduced in Weibell 2011) in developing my experimental model, mindful that many contemporary philosophers (Halimi 2014, Stallman 2003, Kataria 2005, Kronenberg 2014, Khatib, Sarem and Hamidi 2013, Veugelers 2011, Aloni 2007) have also built on Rogers' framework. Halimi for example contends that a new humanist approach to education is "needed in order to provide children and adults with new landmarks" for 21st-century progress (2014, 315), while Aloni points out that a 21st-century humanist education should enhance "personal autonomy and authenticity, self-actualization, critical thinking, creative imagination, respect for persons, empathetic caring, involved democratic citizenship, as well as adherence to global ethics of human rights, multiculturalism, and environmental responsibility" (cited in Veugelers 2011, 36).

Lying within the broad theoretical terrain of humanistic education, is the idea of "competency", a word that is not only not synonymous with 'competent' but also has a different meaning in the educational sphere from the one it has in music performance cultures, where competent means 'adequate'. In their 1997 training and development article on competency modelling, Richard and Mirabile define a competency as "a knowledge, skill, ability, or characteristic associated with high performance on a job" (2). The OECD's 'DeSeCo (The Definition and Selection of Key Competencies) Executive Summary' extends this definition by stating that "a competency is more than just knowledge and skills", a point that connects with the one I made earlier: "It involves the

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ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context" (2005, 4). Rychen and Salganik offer more detail:

> a competence [is] the ability to successfully meet complex demands in a particular context. Competent performance or effective action implies the mobilization of knowledge, cognitive and practical skills, as well as social and behaviour components such as attitudes, emotions, and values and motivations. A competence – a holistic notion – is therefore not reducible to its cognitive dimension, and thus the terms competence and skill are not synonymous (2003, 2).

The complex and holistic nature of competency is reflected in the issues raised above, and complexity – especially the complexity of the learning model – remains another theme that runs strongly throughout my research. This stands in stark contrast to the conventional idea of music learning, especially learning for the profession of performer or composer, which is so individually based and self-driven. Complexity informs my working definition of competency here: the capacity to meet complex and nuanced demands by implementing knowledge, skills and social behaviours in multiple contexts.

Competency development can be track and measured through the process of competency mapping. This is "the process of identifying the specific skills, knowledge, abilities, and behaviours required to operate effectively in a specific trade, profession, or job position" (The Competency Group 2018), and is used in the work place to "pinpoint where career development needs to be directed" (Johansson 2019, 7). Competency maps also allow people to "identify their skills and competencies, and the level of said competencies" (ibid, 1). Competency profile maps are able to show the "unique combination of capabilities" a person possesses and allows them "find out where they are and where they are going" in terms of their professional development (Kiss 2019). These maps are most often used within human resource departments as tools for selecting appropriate employees and guiding professional development decisions (Sanghi 2016). Andrew Walls provided a competency map (reproduced in Figure 1.1) in his article 'Are You Prepared For the Job Marketplaces of 2020? Check Using This Tool' (2018), allowing readers to map out their own competencies and then assess where their strengths lie and which competency areas may need improving.

These maps are most often used in this context but they can also be used in education to track, measure and demonstrate competency development. The available literature on competency profile mapping in education shows that several medical training programmes

have adopted this method to ensure that future doctors, nurses, dentists and pharmacists have both the knowledge as well as the competencies to successfully operate as health care professionals once qualified (see Breen et al. 2014, Kaprielian et al. 2013, and Benson 2019 for example).
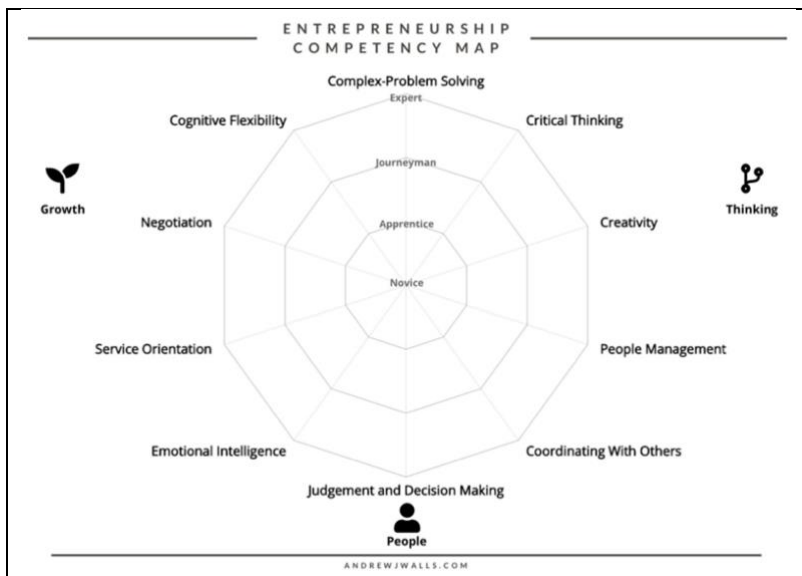
Figure 1.1: Entrepreneurship Competency Map (Wall 2018)

Within the field of general education, Mohamed Ally has successfully used competency maps to illustrate which competencies will be needed by teachers in the future. After presenting the competency map seen in Figure 1.2, Ally explains that he hopes that "the competencies presented in this study will help to identify that gap [between how teachers currently instruct and what will be required of teachers in the future] so that relevant teacher training is provided" (2019, 312).
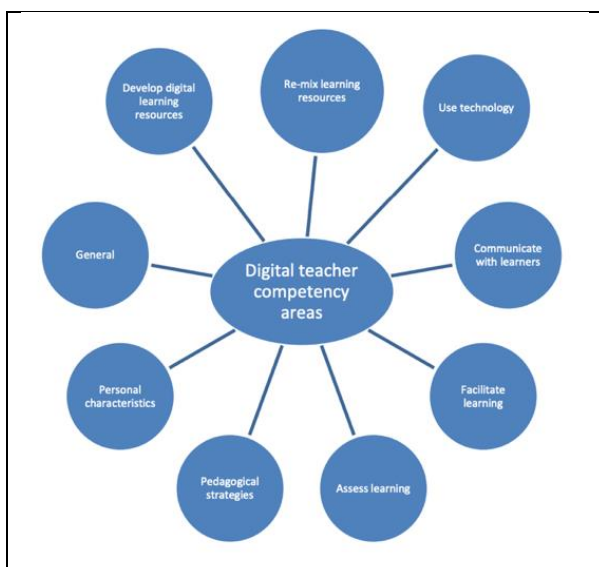
Figure 1.2: Digital Teacher Competency Areas (Ally 2019)

Sanchez-Carracedo et al. demonstrate how competency maps can be used in order to design STEM curricula that simultaneously develop knowledge and competencies (2018, 448-468), while Grann et al. show that competency maps can also be a useful tool for postgraduate students "to conceptualize their academic experience, communicate accomplishments, and focus their future studying" (2014, 169).

Almost all of the literature available on competency profile mapping within education is related to post-secondary studies, with just a handful of studies relating to middle and high school (see Gusnardi et al. 2016, and Medriati et al. 2013). I was unable to find any prior research that mapped competency development through music at any stage, but I found it useful as a tool in this dissertation to visually represent the growth and development that took place in various competency areas throughout the study.

The literature provides multiple 21CC frameworks and while there is generally some overlap between which competencies are included on these lists, they "rarely match one another exactly", as Soland et al point out (2013, 3). The OECD's DeSeCo Project (2005) provided just three:

Use Tools Interactively	Interact in Heterogeneous Groups	Act Autonomously

Table 1.1: OECD's DeSeCo Project Competency Framework (2005)

The Partnership for 21st Century Learning (P21) on the other hand, offers four:

Creativity	Critical Thinking	Communication	Collaboration

Table 1.2: P21 Competency Framework (2009)

By 2010, Finegold and Notabartolo, in an interdisciplinary literature review they produced for the Hewlett Foundation, had identified 20 key competencies, in five categories:

ANALYTICAL SKILLS	INTERPERSONAL SKILLS	ABILITY TO EXECUTE	INFORMATION PROCESSING	CAPACITY FOR CHANGE
Critical Thinking Problem Solving Decision Making Research & Inquiry	Communication Collaboration Leadership & Responsibility	Initiative & Self-Direction Productivity	Information Literacy Media Literacy Digital Citizenship ICT Operations & Concepts	Creativity & Innovation Adaptive Learning/ Learning to Learn Flexibility

Table 1.3: Finegold and Notabartolo Competency Framework (2010, 7)

Two years later, Pellegrino and Hilton went further, listing 37 competencies under three headings and divided into eight subgroups:

COGNITIVE COMPETENCIES	INTRAPERSONAL COMPETENCIES	INTERPERSONAL COMPETENCIES
Cognitive Processes and Strategies Critical thinking Problem Solving Analysis Reasoning/Argumentation Interpretation Decision making Adaptive learning Executive function **Knowledge** Information literacy (research using evidence and recognizing bias in sources) Information and communications technology literacy Oral and Written Communication **Creativity** Creativity Innovation	**Intellectual Openness** Flexibility Adaptability Artistic and cultural appreciation Personal and social responsibility (including cultural awareness and competence) Appreciation for diversity Continuous learning Intellectual interest and curiosity **Work Ethic / Conscientiousness** Initiative Self-Direction Responsibility Perseverance Productivity Grit Type 1 Self-Regulation Professionalism/ethics Integrity Citizenship Career Orientation **Positive Core Self-Evaluation** Type 2 self-regulation Physical and Psychological health	**Teamwork and Collaboration** Communication Collaboration Teamwork Cooperation Coordination Interpersonal Skills Empathy/Perspective Taking Trust Service Orientation Conflict Resolution Negotiation **Leadership** Leadership Responsibility Assertive Communication Self-presentation Social influence with others

Table 1.4: Pellegrino and Hilton Competency Framework (2012, 32-34).

The 35 'skills' shown in the O*NET database are divided into basic and cross-functional skills, as shown in Table 1.5 below. Basic skills such as reading facilitate the acquisition of new knowledge, while cross-functional skills (such as problem solving) extend across several domains of activity. Under these two broad headers, the skills are grouped into smaller categories.

Basic Skills	
CONTENT SKILLS	**PROCESS SKILLS**
Reading-Comprehension Active Listening Writing Speaking Mathematics Science	Critical Thinking Active Learning Learning Strategies Monitoring

*Table 1.5: O*NET Competency Framework (1 of 2)*

Cross-Functional Skills				
SOCIAL SKILLS	COMPLEX PROBLEM SOLVING	TECHNICAL SKILLS	SYSTEM SKILLS	RESOURCE MANAGEMENT SKILLS
Social-Perceptiveness Coordination Persuasion Negotiation Instruction Service Orientation	Complex Problem Solving	Operations analysis Technology design Equipment selection Installation Programming Operation monitoring Operation and Control Equipment maintenance Troubleshooting Repairing Quality control analysis	Judgment and decision making Systems analysis Systems evaluation	Time management Management of financial resources Management of material resources Management of personnel resources

Table 1.5 Continued: O*NET Competency Framework (Tsacoumis and Willison 2010, 18-20).

Given this array of choices in drawing up my own definition of competencies for the purposes of this research, I found Finegold and Notabartolo's five categories the most useful as they allowed me to look at competencies as clusters, rather than stand-alone entities. Redesigning Finegold and Notabartolo's headings and bolstered by some of Pellegrino and Hilton's detail, the framework that I developed in order to conceptualise competency is expressed in the following table.

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving Decision Making Reasoning & Argumentation Interpretation Research & Inquiry	Communication Collaboration Empathy Negotiation Self-Presentation	Initiative Self-Direction Productivity Perseverance Responsibility Grit Self-Regulation	Information Literacy Media Literacy Digital Citizenship ICT Operations & Concepts	Creativity Innovation Flexibility & Adaptability Metacognition Curiosity

Table 1.6: 21st-century Competency Research Framework

As can be seen from the frameworks given above, there is still some debate on what actually constitutes a set of 21st-century competencies. It is not just a question of

reinventing terminology. Indeed, Jerald warns against the "flashy phrases and poorly defined buzzwords" that tend to characterize what he calls the "21st century skills" movement. "Before asking teachers to take on this new challenge," he says, "state and district leaders… should make a serious effort to understand the best empirical evidence on what skills will be necessary for students to succeed in careers and personal lives, and they should communicate that information in clear and concrete ways that make sense to the classroom teachers who ultimately will be responsible for teaching them" (Jerald 2009, 1). As I will explain in Chapter 2, I spent a great deal of time investigating and generating thorough and easily understandable definitions for each of these competencies in preparation for the course. I felt that it was not only important that I, as the teacher and researcher, had a clear and concrete understanding of each of these competencies, but that the students I taught had an equally strong understanding of these expectations.

Despite the number of helpful resources that are taking on the challenge of defining and interrogating 21st-century competencies in recent years, this remains an area that requires more thought. Part of the purpose of this thesis, indeed, is to try and contribute theoretically to an on-going debate, not only about what constitutes competency but how, pedagogically, competencies are developed. The Ontario Public Service's document '21st Century Competencies for Ontario – Foundation Document for Discussion' calls on educators to "emphasize and develop… competencies in explicit and intentional ways through deliberate changes in curriculum design and pedagogical practice" (2016, 3). Some of the current pedagogical practices gaining momentum in the 21st century include Brain-Based Learning (Jensen 2008, Hardiman 2012, Tokuhama-Espinosa 2011), Personalized Learning (Dabbagh and Kitsantas 2012, Samah et al. 2011, Powell and Kusuma-Powell 2011, Grant and Basye 2014, Rickabaugh 2016), Open Content Learning (Blesinger and Bliss, 2016, Okada, et al. 2012, Donelan et al. 2010, Brown and Adler 2008), Gamification, Project-Based Learning and Blended Learning. I did not use the first three models on this list in my own research, but they did inform my approach. The last three models on the list, however, were used extensively in this course and will be discussed in Chapter 2.

Teacher and Researcher

In order to investigate my research questions, I conducted classroom-based research (Taber 2013, Stephan and Cobb 2003) where I was both the teacher and the researcher. Baumann and Duffy identify four features of a what they call a 'teacher-researcher':

(a) teacher-researchers have an insider, or emic, perspective;
(b) they mix theory and practice (praxis) while teaching and researching within their classroom worlds;
(c) teacher-research is pragmatic and goal oriented – there are practical classroom problems that need to be solved; and
(d) teacher research involves disciplined inquiry which means that studies are intentional and systematically conducted (2001, 614).

Alexakos notes that teachers can provide unique and valuable insight into classroom activities due to their "historical, emotional, and physical positionality and proximity" (2015, 24). He goes on to ask, "How could anyone write about… the challenges and difficulties, the exhilarations, the bonds, and the emotional ups and down that are so much part of teaching… if they have not experienced and felt them?" (ibid).

While the role of the teacher-researcher is clearly defined, and the personal insights that can be offered are seen as a benefit rather than a disadvantage, I still grappled with the ideas of subjectivity, bias, and validity in my research. As Pauline Rooney points out, "the validity of insider research, particularly in qualitative studies, is subjected to endless debate and scrutiny and it presents numerous unanswered questions" (2005, 3). These questions include, "What effect does the researcher's insider status have on the research process?", "Is the validity of the research compromised?", "Can a researcher maintain objectivity?", "Is objectivity necessary for validity?" and "Does the researcher's relationships with subjects have a negative impact on the subject's behaviour such that they behave in a way that they would not normally?" (Ibid 3-15). These were certainly questions that I considered throughout this research, but I was reassured by Taber's assertion stating that teacher-researcher accounts should

> include features of personal history that 'explain' research interests, or include anecdotal material to indicate how hunches arose. False starts, rather than being omitted, may even seem to be celebrated in some reports… If a researcher sees herself as an integral part of the context being studied, interacting with the informants in a process of co-constructing data, then it makes sense to write an account where the researcher's role is recognized rather than obscured (2013, 174).

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Given the constructivist underpinnings of this research and the importance of social interaction in the construction of knowledge within this theory, I felt that teacher research, which acknowledged the relationships between the students and myself as the teacher-researcher, would be the most fitting research methodology. As a teacher-researcher, then, I played dual roles in my classroom throughout this research project and as I present my research during the four cycles in Chapters 3 to 6 I show how I defined my goals, methods, and expectations in each role.

As a music teacher, and the head of music at Redhill School (which I will describe in detail at the beginning of Chapter 2), I was expected to increase the number of students selecting music at FET level (Grade 10 to 12), build the school orchestra, and ensure that all students produced good academic results. My personal goals as a music teacher included fostering a deep love and understanding of music in all students, developing well-rounded critical and creative thinkers, and emphasizing the importance of music in the curriculum where, in many cases, this subject was under threat of being 'absorbed' into general cultural programmes. Within my Grade 7 class, specifically, I aimed to teach my students how to play a musical instrument, develop their musical vocabulary, provide them with an understanding of the various elements of music, and develop their 21st-century competencies. This final teaching goal overlapped with my research goals, as explained later in this chapter.

The methods that I used to fulfill my teaching aims included project-based learning, gamification, and the flipped classroom, and I assessed students'' musical progress on rubrics that looked at their practical skills under the headings of 'technique', 'intonation', 'accuracy', and 'fluency'; and their theoretical and analytical skills under the headings of 'accuracy', 'correct use of vocabulary', and 'insightful observations'.

As a researcher, my goal was to answer the research questions set out earlier in this chapter, that dealt with 21CC development, pedagogy, assessment, awareness, and transferability. I used a case study methodology to do this, as I will explain more thoroughly in Chapter 2, and conducted observations and focus groups in order to collect data. Taber notes that in classroom-based research we can view "any work which the teacher scrutinizes, as a form of data collection" (2013, 136). As a teacher, I reviewed and marked all of the work that was submitted to me in order to generate a mark for the students. As a researcher, I also analyzed this work for evidence of competency development.

The competency observations I made as a researcher were also captured on various rubrics. The development of these competency-based rubrics, as well as the course and research design, will be discussed in greater detail in Chapter 2.

Chapter 2 – Setting Teaching and Research Goals for a Future-focused Music Classroom

As I mentioned in Chapter 1, I conducted research in my own classroom at Redhill School in Johannesburg, South Africa. Redhill was first established in 1907 as St Winifred's School for Girls, before being rebranded as Redhill in 1941, and becoming a co-educational institution in 1974 (www.redhill.co.za/about/history). Redhill has always been a progressive and forward-thinking school. The school's moto, "Free to Build", is central to the school's philosophy and is evident in the constant drive to build better facilities, programmes, policies and classroom practices. The current Executive Head, Joseph Gerassi, is an active participant in local and global education communities. He often shares information that he has gathered at local and international conferences with his staff and is dedicated to keeping Redhill at the forefront of best educational practice.

Redhill offers an extensive professional development programme to all of its teachers. "Talking About Teaching and Thinking" (TATT) sessions provide teachers with the opportunity to learn about and discuss current pedagogical research and practices, while "EdTech Training" sessions provide teachers with advice and support on how to incorporate technology into their classes in meaningful and appropriate ways. I am heavily involved in both of these initiatives, leading TATT sessions and contributing to the curriculum and design of resources. Expert speakers are invited to the school on a regular basis and staff engage in school wide professional development on a weekly basis. Innovative classroom practices are not only encouraged, but expected from the staff at Redhill.

Gerassi is also a strong supporter of the arts and has provided the arts faculty, particularly the music department, with a great deal of time, funding, and flexibility to produce a cutting edge programme. The Redhill Music Department functions across the pre-preparatory, preparatory, middle and high schools. There are four full-time and one part-time class music teachers, as well as 19 peripatetic teachers who provide individual instrumental tuition. As the head of the music department I am responsible for curriculum development and assessment, and teach music to the Grade 7 to 12 students. During the senior preparatory phase of school, every child is provided with the opportunity to experiement on a different orchestral instrument each term, thus, every child entering my research project will have received one term of group tuition on each of the following instruments: flute or

clarinet, trumpet, trombone or euphonium, and violin or cello.

Redhill is one of the most expensive day schools in Johannesburg. Current fees for Grade 7 are R143 818.00 ($8 535.00) per annum[2], and each department enjoys a generous and sizable budget. Redhill provides resources and support that make it an ideal environment in which to conduct research, but it is by no means a typical South African school and thus raises several questions about privilege and transferability.

Inequality within South Africa is "starkly visible [through the] coexistence of extreme poverty and extreme wealth" (Chatterjee 2019, 839). Recent data shows that "One percent of the South African population owns about 50% of all the country's wealth, and the top decile together owns more than 90%" (von Fintel and Orthofer 2020, 577). This disparity in wealth makes access to a private school, like Redhill, impossible for most South Africans. In Gauteng, which is one of the richer South African provinces, 11.6% of students are enrolled in private or independent schools. Nationally, however, just 4.4% of South African students are able to attend private schools (Languille 2016, 529-532).

This economic division falls quite clearly along racial lines where "white South Africans earn, on average, 369 percent more than Africans" (Salisbury 2016, 48). This can be seen in the school's demographics. Despite white South Africans accounting for just 8.1% of the population, they make up 53.2% of Redhill's students (as seen in Figures 2.1 and 2.2).
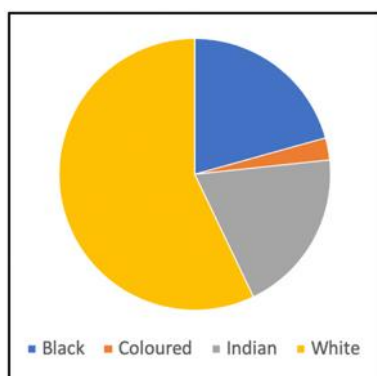
Figure 2.1: Redhill School Racial Demographics (adam.redhill.co.za)
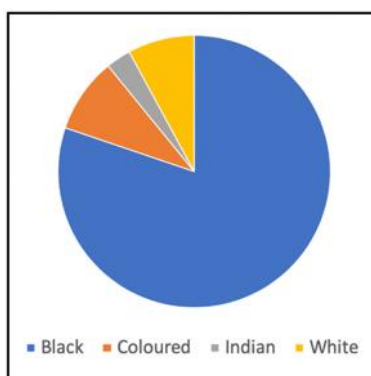
Figure 2.2: South Africa Racial Demographics (statssa.co.za)

Racial inequality can be seen as both a cause and a result of educational inequality. Branson and Lam note that, while black South African students generally do not perform as well as white students (as seen in Figure 2.3 where white students complete

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[2] The national average salary in South Africa is R257 184.00 ($15 260.00) per annum (BusinessTech 2019).

substantially higher levels of schooling than black students, and Figure 2.4 where substantially more black students have been required to repeat a grade of school), this can be "largely explained by school quality (as proxied by school fees)" (2010, 104). Salisbury agrees, noting that achievement discrepancies "may not be connected to the institutionalized discrimination of apartheid, but may instead reflect the lower quality of education obtained by Africans and coloreds during their years in school" (2016, 48). Salisbury goes on to note that this lower quality education "fails to provide Africans and coloreds with the productive skills which employers reward in the labor market" (ibid), thus making them less employable, less likely to receive comparable remuneration for their work, and therefore, less able to provide their children with a quality education that could remedy this situation. This pernicious vicious circle is of great concern, but I believe that it is something that could begin to be addressed through the inclusion of a competency-based curriculum in all schools. This is a point I will return to later in this dissertation.
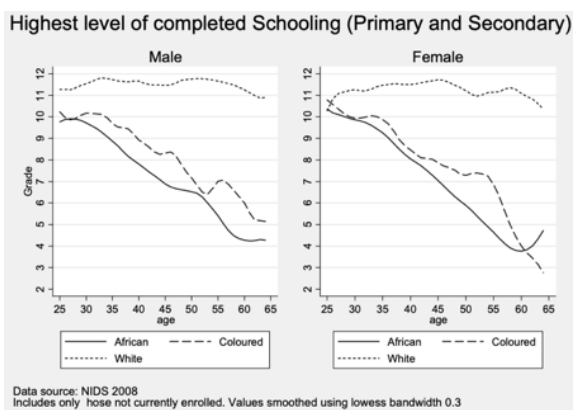
Figure 2.3: Highest level of completed schooling according to population group. Reproduced from Branson and Lam (2010, 90)
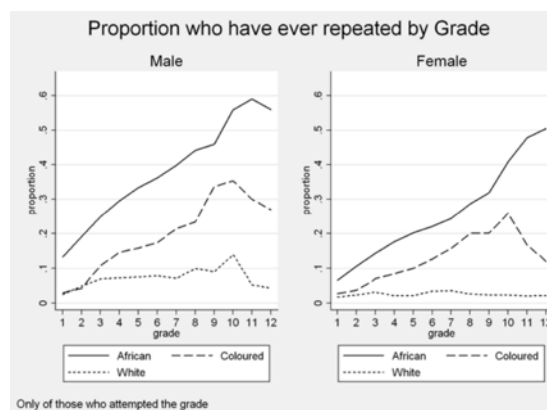
Figure 2.4: Proportion of students repeating a grade according to population group. Reproduced from Branson and Lam (2010, 95)

Despite the fact that music education is expected to be taught as a part of the creative arts learning area in government schools, "economic disparities mean that only the most basic musical education" (Rodger 2014) is offered in these settings. If music is offered at all, it is usually taught by "general class teachers, who have no or little specialized music training" (Herbst et al. 2005, 261) and in some cases "principals do not want to offer the subject [as it is] costly to obtain the… equipment needed to teach music properly" (Jansen van Vuuren 2011, 9). Conducting research in a highly privileged school, like Redhill, allowed me to explore various ideas and options without any financial or resource related considerations. I did, however, always bear in mind how the lesson and projects I constructed for my students could be adapted for use in state schools and I will discuss these adaptations in Chapter 7.

Curriculum and Pedagogy

In order to research the extent to which 21CCs can be developed through class music education, I needed to design a course that supported this endeavour. Many music education advocates (for example Martin 2014, Alta 2012, Kalivretenos 2015, Walter 2015, Kwan 2019) still claim that studying music in any way at all provides a variety of extra-musical benefits, such as academic improvement, self-esteem growth, and development of patience and discipline. However, this is not necessarily the case. To take one 21st-century competency, critical thinking, for example: Onur Topoğlu, in a paper presented at the 5th World Conference on Education Sciences states that a "poorly designed music lesson cannot force critical thinking" (2014, 2255). To develop this skill in the music class, the "lesson itself must be planned to force the individual to think critically", music teachers must "give a range of examples from various contexts" and "teachers must design music lessons in accordance with this purpose" (ibid). He also cites Lee Pogonowski's view that "Students who are taught in a traditional, purely theoretical approach to musical problem solving miss out on opportunities to develop critical thinking skills" (in Topoğlu 2014, 2255).

Furthermore, although practical music making can be viewed as automatically collaborative, developing co-operation between people, it is not a given that this translates to other contexts. Neither is the comfortable sharing of musical ideas across pieces or genres the norm, as my findings from Cycle 4 show: composers often jealously guard their right to claim a particular piece, section or melodic phrase to be their own intellectual property. As a musician in a world of music-making, I therefore started from the premise that nothing about music *per se* as a 'subject' or 'learning area', will automatically develop the competencies as I have defined them in Chapter 1. I thus looked right outside the music education literature for a model for my course design for this research. I found that L. Dee Fink's 'Significant Learning' (SL) model (2003) was best suited to the design of a course through which I could not only promote the development of 21CCs through music in 2019, but also assess the degree of success in achieving that goal. It helped me to distinguish between my work as a teacher and my work as a researcher, despite the fact that the two activities would often happen at the same time and place (in the classroom), and I return later to this point when I talk about the Competency Research Framework that I developed.

Although Fink's SL model is intended for tertiary level (age 18-21), it offers many interesting points of departure for students aged 12-13, particularly the concepts of active learning, significant learning, and educative assessment. These concepts, which I will discuss in more detail later in this chapter, are indebted to the constructivist notions of learning through social and environmental interaction (Piaget 1969, Vygotsky 1978, Bruner 1990, Von Glaserfeld 1995).

I was particularly struck by the usefulness of Fink's 12-step framework, grouped in three phases (Fink 2003, 1), which I adapted for my purpose, bearing in mind that on the level of delivery my course design and research design would be very similar, but on the level of record-keeping and assessment they would diverge somewhat. Fink's 'Initial Design Phase', in which the aim is to "build strong primary components" contains five steps:

1. Identify important situational factors;
2. Identify important learning goals;
3. Formulate appropriate feedback and assessment procedures;
4. Select effective teaching/learning activities;
5. Make sure the primary components are integrated.

The second, 'Intermediate Design Phase' ("assemble the components into a coherent whole") has three steps:

6. Create a thematic structure for the course;
7. Select or create an instructional strategy;
8. Integrate the course structure and the instructional strategy to create an overall scheme of learning activities.

The 'Final Design Phase' (finish important remaining tasks) has four steps:

9. Develop the grading system
10. De-bug possible problems
11. Write the course syllabus
12. Plan an evaluation of the course and of your teaching (ibid).

It is not possible in one chapter to detail all my planning strategies and lesson plans in relation to all 12 of Fink's steps. I will briefly outline, rather, how I interpreted Steps 1 and 2, because Step 1 clearly relates to the more concrete environment (outlined at the beginning of this Chapter) while Step 2 is arguably the most philosophical of Fink's steps, and as such, relates to Chapter 1. After that, I will briefly explain how Fink's other steps impinged on my research design.

The Implications of Fink's Steps 1 and 2 for My Project

Fink suggests several questions that could be considered under Step 1, the most significant one for me being, "How many students are in the class?" (2003,7). Although in late 2018 I was uncertain of the precise number of students I would teach, I anticipated having four classes of approximately 20 students each. This and some other assumptions based on several years' teaching at Redhill School turned out to be inaccurate, necessitating many last-minute changes to my course design, and hence research design, as I explain at the end of this chapter.

"What prior knowledge, experiences, and initial feelings do students usually have about this subject?" and "What are their learning goals, expectations, and preferred learning styles?" (Ibid) are two other questions posed by Fink. My course was going to be taught to male and female Grade 7 learners who were born in 2006, making them 12 or 13 years old during the study. I knew that most of these students would have attended the preparatory school linked to the high school and thus would have taken part in group instrumental lesson on high strings, low strings, high brass, low brass, flute, or clarinet during Grade 5 and 6 and would thus be entering Grade 7 in 2019 with some 'group music' experience.

Fink also asks, "How long and frequent are the class meetings?', "How will the course be delivered: live, online, or in a classroom or lab?", and "What physical elements of the learning environment will affect the class?" (Ibid). I had taught this course for three years before embarking on my case study and had planned according to the precedent that had been set there. Indeed, it was my experience there that inspired this research. As is my usual practice, however, I also planned to improve on weaknesses and build strengths, and so the curriculum in 2019 was not exactly the same as in the years 2016 to 2018. I envisaged having two 45-minute classes in a six-day cycle, but when the school revised the timetable at the end of 2019 it became three 55-minute classes per 10-day cycle. This change, to (effectively) two music lessons one week and one the following week, meant that I had less face-to-face time with students.

This, in turn, led to my decision to use 'blended learning' – a mixture of virtual and face-to-face teaching (Slomanson 2014) – so that content delivery – even on a musical instrument – could take place online as well as in class (I discuss blended learning below.) I therefore planned that students would watch short video clips and complete online assessments in between some of their weekly classes, which is something that I may not have done

otherwise. I still knew, however, that they would have access in class and at home to one of the instruments rented by the school (flute, clarinet, alto saxophone, trumpet, trombone, euphonium) and I planned that they would perform on these instruments in both a solo and ensemble context.

Fink's last questions in Step 1 are about factors external to the course itself: What learning expectations are placed on this course "by the institution, the profession [and] society?" (Fink 2003, 7). These factors were very important in my case. The expectations of the South African Government's Department of Basic Education (DBE, which means school or college, as opposed to university level) are clearly set out in their latest (2011) Curriculum and Assessment Policy Statement (CAPS 2011). The topics that should be covered in music in Grade 7 are the following:

Music Literacy:
- Pitch: treble and bass clef note names, sight singing using tonic sol-fa
- Rhythm: crotchet quaver, minim, semibreves, dotted notes, clapping or drumming short rhythmic phrases and polyrhythms

Music Listening
- Active listening to a variety of musical styles and describing: meter, instrumentation, tempo, dynamics, character, texture, meaning.
- Following a musical score
- Creating a graphic score

Performing and Creating Music
- Breathing exercises
- Sing a variety of musical styles in tune
- Accompany songs
- Play music from a graphic score
- Create instrumental and vocal music in a group and solo context
- Create sound pictures based on a story or poem
- Write a four-line melody with lyrics based on a social issue (Ibid).

Teaching in a private school I was not obliged to follow this State (public school) curriculum, but I followed the spirit of it, as I felt it important to identify with national goals. I knew that in the privileged environment of Redhill I would be able to provide students with an enriched learning experience that goes beyond the requirements of the curriculum, as well as to incorporate multicultural considerations, which acknowledge the need to decolonise the curriculum. I took heed of Achille Mbembe's point that "syllabi designed to meet the needs of colonialism and Apartheid continue well into the post-Apartheid era" and I wanted to avoid the "fundamentally cynical" situation he describes in which institutions (and curricula – including, ironically, the CAPS curriculum) "whose character is

profoundly ethno-provincial, keep masquerading as replicas of Oxford and Cambridge" (2015, 7-8). I took cognizance of a similar critique from Mareli Stolp (2015), regarding South African university music departments, where many future music teachers are fostered. She highlights the continuing focus on Western classical music 26 years after the end of Apartheid, noting that although these departments might include "jazz, indigenous and popular music in their courses, the emphasis remains in most cases on Western Art Music". She also notes how "Western music theory based on the so-called 'common practice' period dominates music theory curricula" in spite of the fact that it "has little or no bearing on composition, performance and music-making practices carried out by most South Africans today" (ibid).

If 'learning expectations' are already so skewed in South Africa, it was clear that this needed to be addresses in the design of my course. I thus resolved to place a greater emphasis on South African music content and to encourage students to think critically about the types and points of origin of the music that we would study and not take reading and writing in staff notation for granted, as a norm.

Applying Fink's 'Step 2: Identifying Important Learning Goals'

Fink suggests that the course designer begin by asking the following large questions: "What would I like the impact of this course to be on the students 2-3 years after the course is over?" and "What would distinguish students who have taken this course from students who have not?" (2003, 8). Drawing on his Taxonomy of Significant Learning, reproduced in Figure 2.5, involved taking on the challenge of adapting my teaching to find the kind of 'alternative approaches' Stolp called for, and I now explain that challenge in detail, using Fink's six headings.
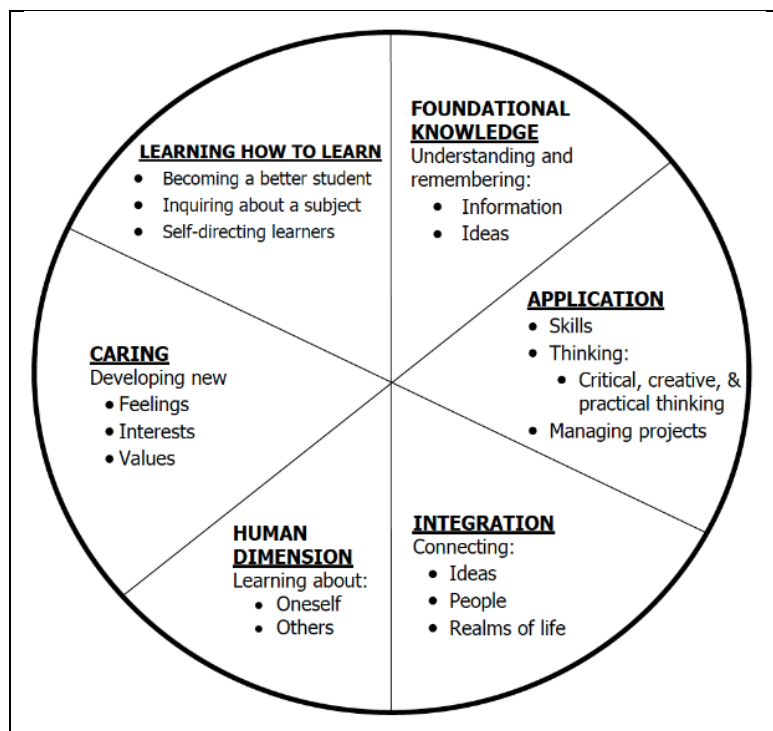
Figure 2.5: Fink's Taxonomy of Significant Learning (2003, 11)

Foundational Knowledge Goals

The primary focus of the Grade 7 music course I designed, using CAPS as a guideline, was the 'elements' of music (pitch, rhythm, meter, tempo, instrumentation, timbre, tonality, melody, harmony, articulation, dynamics, character, structure and texture), which would be explored practically and theoretically in the context of various genres and styles from South Africa, Africa, and elsewhere in the world. Students were also going to learn to play an instrument of their choice in a group and solo context, and basic theory of music, so that they would be able to read and write in staff notation. Christine Lucia's distinction between *music theory* and the *theory of music*, whereby *music theory* is the critical and speculative act of analysis and critique, while *theory of music* is a set of practical tools (the 'elements', as I call them) used to notate Western music (2006, 175-176), has a bearing on my choice of focus. As Lucia points out, while the practical tools are not inherently critical, "it is important, indeed often necessary, for musical parameters to be used within a critical analysis" (173). They become 'critical' when applied, in other words. Thus I aimed to provide my students with an understanding of the elements of music, acknowledging that they were tools of a Western European system of exclusion, and in the South African context, could be seen as a colonial relic (ibid. 177-178). When teaching pitch in staff notation, for example, I wanted to ensure that students understood how arbitrary this concept was. The notes on the five-line stave could only represent pitch in an equal

tempered tuning system and thus, were incapable of accurately representing the pitches of music from all over the world, including music from Africa.

Nevertheless, as Craig Jerald warns when he says that "[a]long with the rhetoric about '21st century skills', a myth has spread in some circles that students will no longer need to learn the academic content traditionally taught in the school curriculum", he also points out that "subject matter knowledge and basic skills are important building blocks for the broader competencies gaining value in the 21st century"; and that "being able to think critically about a topic or solve a problem in a particular domain demands sufficient background knowledge about it" (2009, 30-31). I concur with this view, wanting to provide my students with a broad musical vocabulary that would allow them to think and talk about music in an informed and critical manner. If a student were to decide not to continue their music studies after Grade 7, they would at least leave the music programme as an informed concert goer, equipped with not only a love of music, but also an appreciation of why it sounded as it did, and some basic tools to talk about that. Thus, I was also here embellishing and even challenging the rather 'information-driven' outline of the CAPS curriculum for Grade 7 (above) and, while fulfilling my role as teacher, I was making the course design amenable to my research goals.

Application Goals

Fink identifies that, in addition to the foundational or content knowledge offered by a course, the course designer should also take note of the application skills that the course is capable of developing. In this course, the application skills I was interested in developing (and measuring), were the 21st-century competencies outlined in Chapter 1. These can be seen in Table 2.1.

As these competencies serve as both the application skills of the course, as well as my research goals for this dissertation, and heading Jerald's advice to avoid "poorly defined buzzwords" (2009, 1), I will provide a detailed description of each competency area. Also, given Salisbury's reminder that schools often fail to provide students with the "skills which employers reward in the labor market" (2016, 48), I will comment on how these skills are recognised within the workplace.

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving Decision Making Reasoning & Argumentation Interpretation Research & Inquiry	Communication Collaboration Empathy Negotiation Self-Presentation	Initiative Self-Direction Productivity Perseverance Responsibility Grit Self-Regulation	Information Literacy Media Literacy Digital Citizenship ICT Operations & Concepts	Creativity Innovation Flexibility & Adaptability Metacognition Curiosity

Table 2.1: 21st-century Competency Research Framework

Application Goal 1: Analytical Skills

Craig Jerald notes that "employers rank critical thinking/problem solving as the number one competency they expect to become more important" for students entering the workforce in the 21st century (2009, 50). Aside from the workplace, analytical skills are fast becoming a vital tool for life, because "21st century families must sift through a vast array of information regarding financial, health, civic, even leisure activities to formulate plausible plans of action" (National Education Association 2012, 8); and on a larger scale, "solutions to international problems, such as global warming, require highly developed critical thinking and problem-solving abilities" (ibid). Sue Beers concurs, stating that "to efficiently and effectively survive and prosper in the information-laden future, learners will need the crucial skills of choosing, accessing, using, and applying knowledge to innovate, solve problems, and think critically about information" (2011, 3). This has been made even more apparent in the age of the Covid-19 lockdown period where inaccurate information, that could potentially have life or death ramifications, abounds.

After considering definitions for each of the competencies under the board competency heading of 'analytical skills' by Norris (1985), Facione (1990), Elder and Paul (1994), Harris and Hodges (1995), Durron (2006), Klein et al. (2007), The Partnership for 21st Century Skills Competency Framework (2012), and Fullan (2013), I assembled the definitions shown in Table 2.2 for each of these competencies.

Analytical Skills
The ability to…   • Identify significant problems or questions   • Collect evidence using a variety of digital and analogue sources   • Assess the quality and relevance of the evidence you have collected   • Keep an open mind when analyzing the evidence and consider all sides of the argument   • Combine the ideas found in various pieces of evidence in order to form an overall picture of the argument   • Consider a variety of ways in which the problem could be solved, or question answered   • Form a conclusion   • Acknowledge other possible answers, solutions or perspectives, while supporting your conclusion with the evidence on which it was based

Critical Thinking	Carefully and purposefully consider an idea, taking into account various opinions, perspectives and pieces of evidence.
Problem Solving	Identifying and defining a potential question or problem before considering a variety of solutions to the problem and assessing which solution would be the most effective.
Decision Making	Consider various perspectives and pieces of evidence in order to reach a conclusion
Research & Inquiry	Access data from various sources and evaluate the quality and relevance of the data and the source from which it comes
Analysis	Examine or investigate the components of a text in an organised way to learn more about it
Reasoning & Argumentation	Support your claims with sound, logical explanations that are supported by evidence, while also considering other perspectives.
Interpretation	After reading and understanding a text, formulate your own idea of what the text means, given the other pieces of evidence you are considering in relation to the text.

Table 2.2: Analytical Skills Competency Definitions

By 'text', here, I was referring to any item to be analysed or considered, something akin to Foucault's notion of 'discourse'. This could be an article, a musical score, an audio recording or a social situation.

Application Goal 2: Interpersonal Skills

The broad competency of interpersonal skills with its sub-competencies of communication, collaboration, empathy, negotiation, and self-presentation, has become increasingly relevant as technology makes countries more and more globally interconnected, as has (again) been compellingly shown during the Covid-19 pandemic. Already in 2009, Jerald pointed out the massive impact made by "the breaking down of economic, social, and intellectual borders between nations" on the types of skills needed to successfully operate in the 21st-century workplace (2009, 6). "In a world in which information flows instantaneously to a global audience" Beers says, "never before have communication and collaboration been so vital" (2011, 7), and The National Education Association warn that the "power of modern media and the ubiquity of communication technologies in all aspects of life make teaching strong communication skills even more important" (2012, 13). As The

Ontario Public Service's 'Foundation Document for Discussion' remarks, each new communication tool "has its own rhetoric", all of which need mastering (2016, 12): one needs to understand the difference, for example, between writing an effective email to a colleague versus writing an effective tweet, as the Trump Administration in the US has (also compellingly) shown.

Interpersonal skills are vital in the world of work, as shown above; and they are equally important in the world of education. Vygotsky (1978) reminds us that knowledge is constructed through collaboration and social interaction. The interpersonal application skills were thus not only an expected outcome of this course and a research goal for this study, but an important tool in the development of students'' knowledge and understanding.

After consulting the The National Education Association's 'Preparing 21st Century Students for a Global Society' document (2012), Fullan (2013), Brown (2014), and Ontario Public Service's 'Foundation Document for Dicsussion' (2016), I formulated the following definitions for each of the 21CC under the broad competency heading of Interpersonal Skills.

Interpersonal Skills
The ability to…   - Clearly share your ideas using oral, written and non-verbal means of communication.   - Listen carefully and empathetically in order to decipher what someone is trying to communicate to you.   - Understand that the people you are interacting with may not share the same background, culture, beliefs, education or language as you.   - Treat all team members with respect and empathy.   - Maintain an open mind and always be willing to learn from, as well as share knowledge with others.   - Use various communication technologies and understand the different modes of communication that are acceptable or appropriate on each platform.   - Present yourself and your ideas in a manner that is appropriate to a given situation.

Communication	Organise and articulate thoughts and ideas clearly and effectively through speech and writing, supporting statements with explanations, comparisons and evidence in order to ensure that the message is understood by the target audience.
Collaboration	Cooperate, compromise and build consensus with diverse groups of people in order to reach a common goal.
Empathy	Temporarily suspend your own ideas and judgements while listening closely to and entertaining someone else's ideas.
Negotiation	Work together to build consensus and reach an agreement.
Self-Presentation	Create a good impression, by behaving in a confident and socially acceptable manner in any given situation.

Table 2.3: Interpersonal Skills Competency Definitions

Application Goal 3: Ability to Execute

Given the accelerating rate of change, longer life expectancy, and other predictions outlined in Chapter 1, ability to execute was clearly going to be increasingly important in the future of my Grade 7s. These skills, also sometimes referred to as 'intrapersonal', have been seen to have a "strong relationship with an individual's capacity to overcome challenges and achieve long-term success" (Ontario Public Service 2016, 10-14) and are, in fact, a more accurate predicator of success and accomplishment than personality and IQ (Abuhassan and Bates 2015, 205).

Notions of ability to execute formulated by Cohen and Thompson (1999), Boekaerts (2005), Endler and Kocovski (2005), Schmidt (2007), Figley (2012), The MBA Research and Curriculum Centre (2013), Perkins-Gough (2013), and Abuhassan and Bates's (2015) all contributed to the definitions I established for these competencies. They can be seen in Table 2.4.

Ability to Execute	
The ability to… • Identify, plan and complete tasks without waiting for instruction • Manage time effectively • Demonstrate a good work ethic • Work persistently towards a goal • Not give up in the face of adversity • Be willing to accept the consequences of your actions • Understand that you are in control of your own success or failure.	
Initiative	Take action to get something done without waiting for someone to tell you what to do or when and how to do it.
Self-Direction	Define, prioritise, and complete tasks without direct instruction and supervision.
Productivity	Apply your efforts systematically to deliver high-quality work on time.
Perseverance	Remain positive and keep working on a problem until it is solved, no matter how many times you fail.
Responsibility	Strive to always follow the rules, finish tasks with care and on time, admit your mistakes and be accountable for your actions.
Grit	Set long-term goals and work towards them with commitment and resilience.
Self-Regulation	Exercise control over one's own emotions, behaviour, interactions and movement.

Table 2.4: Ability to Execute Competency Definitions

Application Goal 4: Information Processing

Beers comments that "rapid changes in technology require students to gain new skills in accessing, managing, and using information" (2011,11). With the exponential rate of knowledge doubling (see Chapter 1, page 1), students are expected to find, process and

apply new information at an unprecedented pace. The 21st century is "a world with an overabundance – indeed, a tidal wave – of information that bombards [students] from the time they turn on the television in the morning to the moment they turn off the computer before they go to sleep" (Breivik 2005, 22). While "accessing information today is not [the main] problem; finding the *right* information in an efficient and effective way is" (Beers 2011,11). As Weiner explains, "there is a growing consensus that information literacy and its related competencies, such as media and digital literacy… are essential for individual and community empowerment, workforce readiness, and global competitiveness" (2012, 278). Garner, in her report on the Alexandria Proclamation, similarly highlights the importance of information literacy:

> [It] lies at the core of lifelong learning. It empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals. It is a basic human right in a digital world and promotes social inclusion of all nations (2005, 3).

The definitions provided by Breivik (2005), Donelan et al. (2010), P21's 21st Century Skills Map (2011), Weiner (2012), Silverblatt et al. (2014), Ribble (2017), and Jang and Kim (2018) contributed to the definitions I have set out in Table 2.5.

Information Processing	
The ability to… • Identify what information is needed • Access information efficiently and effectively • Critically assess information • Understand the construction, purpose and various interpretations of information • Act in an appropriate, responsible and respectful manner online • Use available technologies to enhance information collection, creation and dissemination. • Able to generate fully formed concepts • Access, use, create, and disseminate information in an ethical manner.	
Information Literacy	Access information from a variety of sources; critically evaluate the quality and reliability of information; fully understanding the information, and use information ethically and creatively.
Media Literacy	Understand how and why messages are generated, taking into account which points of view are included or excluded from the message, and how the message may be interpreted by different groups of people.
Digital Citizenship	Use technology in a responsible and ethical way, demonstrating respect for people and information found online.
ICT Operations & Concepts	Use technology correctly and appropriately to communicate, access information, create new information and enhance learning.

Table 2.5: Information Processing Competency Definitions

Application Goal 5: Capacity for Change

The final application skill and broad competency area entitled capacity for change consists of the sub-competencies of creativity, innovation, adaptability, flexibility, metacognition, and curiosity. As The National Education Association reminds us, "in today's world of global competition and task automation, innovative capacity and a creative spirit are fast becoming requirements for personal and professional success" (2012, 24). The need for this skill is also highlighted in Rogers' notion of humanistic education where he notes that "changingness… is the only thing that makes sense as a goal for education in the modern world (1969, 104).

Livingston (2003), Robinson (2006), Blakeslee et al. (2010), Beers (2011), The P21's '21st Century Skills Map' (2011), Brookhart (2013), Surbhi (2015), Ontario Public Service's 'Foundation Document for Dicussion' (2016), Minigan (2017), and Razzetti (2019) contributed to the definitions I have provided for each of the capacity for change competencies below (Table 2.6).

Capacity for Change	
The ability to… • Develop original, inventive and imaginative ideas. • Apply creative ideas to develop actual contributions to a given field. • View failure as part of the learning process. • Always seek new knowledge. • Be open minded and willing to change. • Reflect on the learning process.	
Creativity	Imagine new and original ideas, solutions or possibilities; or put ordinary things or ideas together in new and exciting ways.
Innovation	Implement creative ideas to make a tangible and useful contribution.
Adaptability	Work effectively in a climate of ambiguity and changing priorities.
Flexibility	Shift through various perceptual positions to approach a problem from many different points of view.
Metacognition	Maintain an awareness of your thought process and how you learn.
Curiosity	Possess an inquiring mind and a drive or thirst for deeper understanding and learning.

Table 2.6: Capacity for Change Competency Definitions

The five application goals outlined above are central to the rationale for, and construction of, the music course I taught in 2019, and also act as the standards by which I have assessed the outcomes of this research. The learning goals of 'Integration', 'Human Dimension', and 'Caring' on Fink's Taxonomy of Significant Learning (as shown in Figure 2.5) did inform the construction of this course, but were less central to the research and, therefore, will not be discussed in detail.

"Learning-How-to-Learn" Goals and Metacognition

Fink identified the final learning goal in his taxonomy of significant learning as "Learning-How-To-Learn" (2013, 9). This notion, which I refer to as metacognition, proved to be an essential element in my course and study. The Ontario Public Service goes so far as to say that "'learning the process of learning' must become the core purpose of education in the 21st century (2016,16), and cite Fullan and Langworthy in their description of metacognition as "a 21st century competency that enhances students' ability to acquire skills, knowledge, and attitudes that are relevant to new areas of learning" (ibid). Just as communication and collaboration can be seen as both 21CC and tools to build knowledge (in the constructivist sense), so metacognition can also be viewed as a competency and a tool necessary to develop other competencies. For this reason, I emphasised various thinking routines and strategies in my classroom.

Beers reminds us that we should "Make thinking visible by teaching students the steps in the cognitive process" (2011, 9) and, in order to do this, I designed a series of posters (Figures 2.6-2.9) that outlined the thinking strategies I expected my students to be familiar with and use.
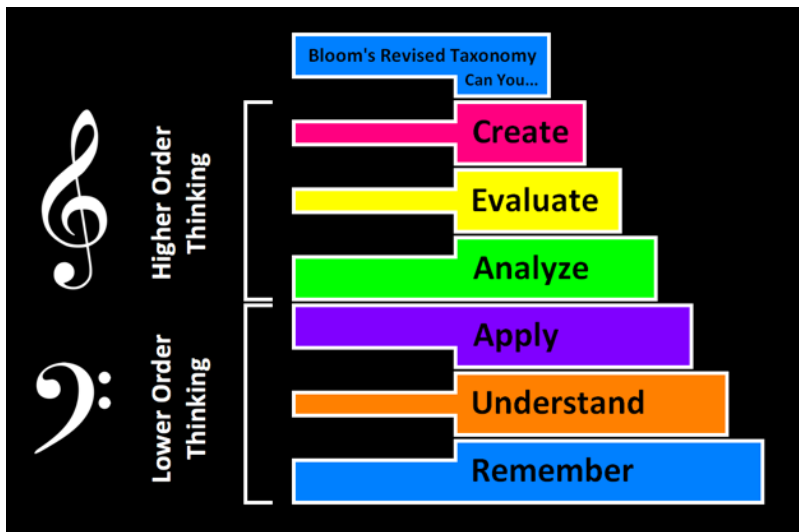
Figure 2.6: Blooms Taxonomy in the Music Classroom. Based on Blooms (1956), and Anderson and Krathwohl (2001).

Figure 2.7: Thinking Hats in the Music Classroom. Based on De Bono (1985).
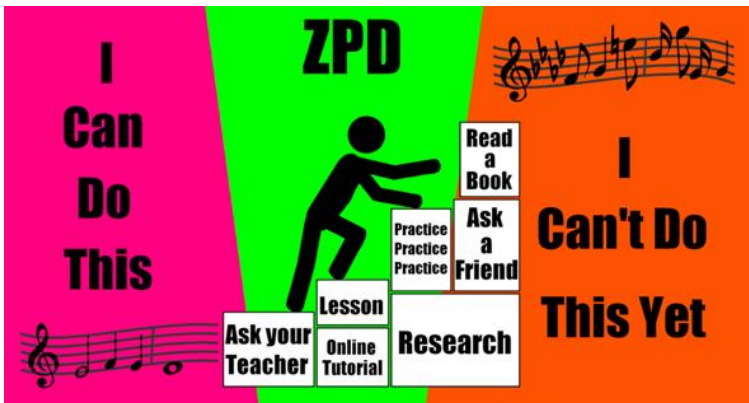
Figure 2.8: The Zone of Proximal Development in the Music Classroom. Based on Vygosky (1978).
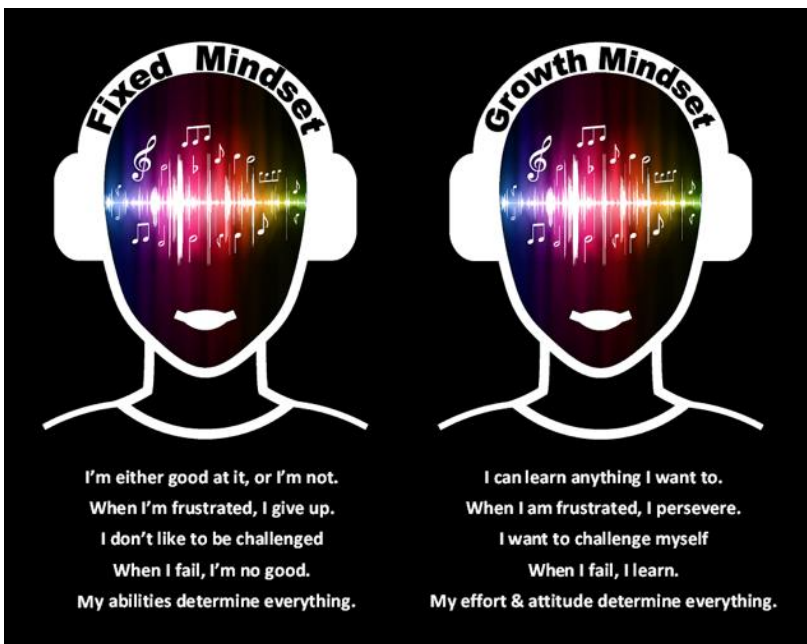
Figure 2.9: Growth Mindset in the Music Classroom. Based on Dweck (2006)

These four thinking strategies (Bloom, De Bono, Vygosky, Dweck) not only assisted students' in this music course and in the development of their 21st-century competencies, but more generally in their academic studies, as will become clear in Chapters 3 to 6.

Fink's Step 3: Formulate Appropriate Feedback and Assessment Procedures

Assessing my student's progress throughout this course was not only an important step in the teaching/learning process but an integral step in my research. Fink reminds teachers that it is essential to provide students with clear criteria and standards if they hope to receive high quality work (2003, 13). In order to make my expectations explicit to my students, I provided them with detailed rubrics. Both the students and I used the criteria set out in these rubrics to assess their progress.

Self-assessment

Self-assessments formed the central reporting structure of this course. I chose the method of assessment because it provided valuable insight into the student's perceptions of their own learning, formed a valuable part of the learning process and, maybe most importantly, developed students' abilities to assess themselves. I believe that honing the ability to critically assess oneself is another incredibly important 21st-century competency that will aid students as they navigate an uncertain and changeable future. Of course, it is also essential in terms of developing metacognitive awareness, and self-reflexive acuity.

Alegant and Sawhill remind us that the practice of self-assessment

> help students develop into "reflective practitioners" who are better prepared to tackle real-world problems (including any situations in which they will be asked to self-evaluate). They encourage students to take risks, promote independent thinking, enhance problem-solving abilities, and foster engagement with subject matter. In short, self-grading and self-assessment create an environment in which deeper, more transformative learning can occur (2013).

As with the other elements that fulfilled two different role within the course that I have identified, self-assessment acted as both a tool of assessment, as well as a teaching tool.

Rubric Construction

Each rubric contained four standards: 'emerging', 'developing', 'proficient' and 'exemplary'. These standards were adapted from the NYC Blended Competencies Project which I will discuss in more detail on page 193. I used this vocabulary consistently throughout the course, and always presented the competencies in the same order and colour. This allowed students' to become familiar and comfortable with this way of assessing

themselves. Table 2.7 below shows an example of one of the self-assessment rubrics used in this course. You will note that each standard is accompanied by an "I" statement and specific, measurable criteria.

Lesson 1			
Step 1: Listen to a song on your own and identify descriptive words that describe your song. Step 2: Join with a partner with the same song, discuss your words and think of more words together Step 3: Join with a group with a different song – write out all of the ways your songs are the same and different. Think of overarching concepts for the similarities and differences you found.			
Analytical Skills: Were you able to correctly identify different characteristics or descriptors of your track?			
Emerging	Developing	Proficient	Exemplary
I identified 1 or 2 correct characteristics	I identified 3 or 4 correct characteristics	I identified 5 or 6 correct characteristics	I identified 7 or more correct characteristics
Analytical Skills: Were you able to find your characteristics' matches or opposites and think of the element they described?			
Emerging	Developing	Proficient	Exemplary
I found this very challenging and struggled to identify the similarities and differences between the two tracks and the elements they described.	I found this challenging, but was able to identify a few similarities and differences between the two tracks. I was unable to identify the elements these words described.	I was able to identify 4 or 5 similarities and differences between the two tracks, as well as the elements these words described.	I was able to identify 6 or more similarities and differences between the two tracks, as well as the elements these words described.
Interpersonal Skills: Were you able to explain your ideas to your partner and group?			
Emerging	Developing	Proficient	Exemplary
I struggled to explain what I was thinking and hearing and could not find the right words to make my group understand me.	I struggled to explain what I was thinking and hearing, but persevered and tried to describe my ideas to my group.	I was able to explain what I was thinking and hearing, but my group did not always understand me.	I was able to clearly explain what I was thinking and hearing so that my group understood what I was saying.
Ability to Execute: Did you complete all aspects of this task?			
Emerging	Developing	Proficient	Exemplary
I found this task too challenging and could not complete it.	I found this task very challenging, but did the parts I could.	I attempted every part of this task, even the parts of it that I found challenging.	I tried to give of my best in every section of this task, no matter how challenging I found it.
Ability to Execute: Were you able to remain focussed throughout the task?			
Emerging	Developing	Proficient	Exemplary
I became easily distracted and my group members and teacher needed to remind me to get back to my work.	I became distracted, but was able to get back to my work without anyone reminding me to continue.	I focussed my attention on my work most of the time and tried to minimise my involvement with peers who were engaged in other activities.	I focussed my attention on my work throughout the task and did not become distracted by my peers who were engaging in other activities.

Table 2.7: Self-Assessment Rubric

The idea that being able to correctly identify that your skills in a particular area were 'emerging' was in fact, in itself, an 'exemplary' skill (paradoxically) that was emphasised throughout. I constantly reinforced the idea that I would be impressed with the accuracy of assessment rather than the quality of the results and that the ability to recognise weakness in oneself is a very valuable strength.

FIDeLity Feedback

Fink explains that FIDeLity feedback is:

> **Frequent:** Give feedback daily, weekly, or as frequently as possible.
> **Immediate:** Get the feedback to students as soon as possible.
> **Discriminating:** Make clear what the difference is between poor, acceptable, and exceptional work.
> **Loving:** Be empathetic in the way you deliver your feedback (2003, 14).

Students were provided with verbal feedback on their progress in almost every lesson. By shifting my role from teacher to facilitator and fellow-learner, I was able to move between groups and individuals, and engage in a dialogue with each student. I found this process incredibly valuable and rewarding, as I was able to converse with students while the work was in progress and in the moment of assessment, rather than assessing their work in isolation after it had been completed. This provided me with a great deal of insight into the way students thought about their work, allowed the students to think through their processes and understand their feedback more fully, and established a solid common understanding of what I expected and what the student intended.

I also provided additional feedback when I felt that students' self-assessment rubrics were inaccurate. These feedback sessions also took the form of conversations and assisted the student and I in establishing a more precise understanding of each other's perceptions. Indeed, I found that the shift that I made from providing mark-based and written feedback to verbal, conversational feedback was one of the most significant and profound changes I myself made as a teacher, during 2019.

Fink's Step 4: Select effective teaching/learning activities

Fink reminds us that "students learn more and retain their learning longer if they acquire it in an active rather than a passive manner" (Fink 2013, 16). This notion is also seen as central in the constructivist and humanistic theory that underpins this study. This course was thus designed to consist entirely of active learning exercises, and included the following pedagogical models: project-based learning, blended learning, and gamification.

Teaching/Learning Activity 1: Project-Based Learning

Project-based learning is a teaching method that is gaining popularity in 21st-century classrooms, owing to its ability to develop 21st-century competencies. Barron and Darling-Hammond note development in students' interpersonal and analytical skills (2008), while Larmer and Mergendoller note the role project-based learning can play in the development of a student's capacity for change (2010). Bell comments that "by implementing PBL, we are preparing our students to meet the twenty-first century with preparedness and a repertoire of skills they can use successfully" (2010, 43).

In Project-Based Learning, students, with guidance from their teachers, generate a driving question around a topic they are interested in. This forms the basis of an enquiry. Students use various media to research their topic and create a project that demonstrates their findings. The project is presented to an audience of classmates, parents and other members of the community for questions and feedback (Larmer and Mergendoller 2012, Vega 2012, Krajcik and Blumenfeld 2006). As Bell puts it:

> PBL is a key strategy for creating independent thinkers and learners. Children solve real-world problems by designing their own inquiries, planning their learning, organizing their research, and implementing a multitude of learning strategies. Students flourish under this child-driven, motivating approach to learning and gain valuable skills that will build a strong foundation for their future in our global economy (Bell 2010, 39).

Teaching/Learning Activity 2: Blended Learning

Blended learning is another pedagogical model that will be used in this course. Blended learning combines synchronous, face-to-face instruction with asynchronous, online digital instruction (Garrison and Kanuka 2004, 95; Emerging and Future Trends in K-12 Education 2014, 12). This teaching model became widely adopted in 2020, as schools begin to reopen after the Covid-19 Pandemic. Stein and Graham note that "educational research suggests blended courses are more effective compared to both face-to-face and online" instruction (2014,15), while Grant and Basye explain that:

> In the past, digital materials have played only a supplementary role in the classroom. Yet, with a blended learning approach, classroom time can be used to engage students in advanced interactive experiences. The online portion of a course can provide students with multimedia-rich content at any time of day, anywhere students have Internet access … Teachers, meanwhile, use their time

more productively, focusing on important activities like developing their students' critical thinking and writing skills and implementing project-based learning. By capturing students' performances in real time, teachers have more opportunities to personalize learning through frequent, timely feedback (2014, 51).

The practical component of the course was shifted to a flipped classroom model, by adapting Philipak's Recorder Karate Method (2002), so that I could provide dedicated, instrument specific instruction to a class of students, who were playing a variety of instruments.

Teaching/Learning Activity 3: Gamification

The final major pedagogical model that was used in this course is gamification, defined by Deterding et al. as "the use of game design elements in non-game contexts" (2011, 2). These elements may include "goals/challenges, personalisation, rapid feedback, visible status, unlocking content, freedom of choice, freedom to fail, storyline/new identities, onboarding, time restrictions [and] social engagement" (Dicheva et al. 2015, 79).

The gamification of content motivates students to engage with the learning process more readily and even "transform a simple or mundane task into an addictive learning process for the students" (Huang and Soman 2013, 24). Dicheva et al. also note the "remarkable motivational power" of games, illustrated by the many people who choose to play games "often without any reward, just for the joy of playing and the possibility to win" (2015, 75). Steinkuehler Squire notes the potential of gamification in education by likening it to online gaming communities:

> You create these communities around the game that do an incredible amount of intellectual work, and when they're done with the work, they will leave the game and go to another game that's more challenging. Can you imagine if we had that kind of environment in classrooms? (cited in Huang and Soman 2013, 6).

One of the most powerful aspects of gamification is that is enables students to use a "learn-by-failure technique that is popular in game-like environments, without the embarrassment factor that usually forms a part of classroom education" (Huang and Soman 2013, 24).

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Fink Steps 5-8: Assemble the Components into a Coherent Whole

Fink suggests that steps 5, 6, 7 and 8 should be used to ensure that the primary components are integrated, create a thematic structure for the course, decide on an instructional strategy for the course, and then integrate theme components to create an overall scheme of learning activities (2003, 26-30).

This section of planning went through various iterations in my case, owing to the number of obstacles I encountered during the school year. I will discuss these obstacles and present the final scheme of learning activities (along with a detailed timeline and research goals) at the end of this chapter. Table 2.8 below shows the activities I planned to include in this course, which was based around the theme of 'the elements of music', before I had to adapt it.

Foundational Knowledge	Instructional Strategy	Teaching/Learning Activity
Music Performance	Blended Learning	Instrumental Karate Ensemble Classes
Pitch	Gamification	Kahoot
Rhythm, Meter, Tempo	Gamification	Clapping Games
Instrumentation and Timbre	Project-Based Learning	Build a Musical Instrument
Melody	Gamification	Code a Sphero Robot to Follow the Contour of a Melody
Texture, Tonality and Harmony	Project-Based Learning	Use PicPlayPost to Create Major and Minor Chords, Chord Progressions as well as Various Textures
Dynamics, Articulation, Character	Free Creative Work	Create and Interpret a Graphic Score
Structure	Gamification	Represent Various Forms Using Baking Supplies
Overview of Element of Music	Gamification	Virtual Reality Treasure Hunt
	Project-Based Learning	Copyright Court Case
	Project-Based Learning	Music Elements Website Design
	Free Creative Work	Music Elements Composition

Table 2.8: Initial Scheme of Instructional Strategies and Teaching/Learning Activities.

Fink's Final Design Phase: Finish Important Remaining Tasks

Fink suggests that the final stages of the course design are spent on developing a grading system, debugging possible problems, writing the course syllabus and planning an evaluation of the course (2003, 31-34). At the end of each semester I was expected, by the schooling system, to provide each student with a 'mark'. This grade was based on all of the work done in class and intended to measure progress and process rather than to

assess the final product. The students were made aware of this throughout the course and understood that a positive attitude and willingness to try were two important aspects of this course.

Rather than 'writing a course syllabus' that I knew the students were unlikely to read, I decided to create a number of bulletin boards in my classroom that contained the relevant information about the course. Figure 2.10 shows that bulletin board that contained the learning goals of the course, as well as definitions of each learning goal, while Figure 2.11 shows the Instrumental Karate Leader Board. Photos of the students were placed under each belt once they reached that level but have been removed from Figure 2.11 to maintain their anonymity.

Figure 2.10: Learning Goals Bulletin Board

Figure 2.11: Karate Belt Leader Board

By making the course syllabus visible on the walls of the classroom and referring to it during classes throughout the year, students became extremely comfortable with the expectations of each lesson and assignment.

Fink's Step 12: Plan an Evaluation of the Course and of Your Teaching

I obviously considered my research goals throughout the construction of this course but designed it, primarily, as a teacher. When I arrived at Fink's final step, however, I switched from 'teacher mode' to 'researcher mode'. This final evaluation became my research project and collection mechanism for the data that will be presented in the rest of this dissertation. As I mentioned in Chapter 1, I conducted classroom-based research, where I acted as both teacher and researcher. I set up a year-long case study (McMillan and

Schumacher 2014, Wilson 2009, Stake 1995, Stone 2003, Hsu, Banwart and Mastny 2000, Clarke and Lehaney 2000, Nadkarni 2001) that incorporated elements of action research (Bradbury 2015, McNiff 2013, Coghlan and Brannick 2014, Nunan and Bailey 2009) and design-based research (Herrington, McKenney, Reeves and Oliver 2007, Kelly, Lesh and Baek 2008). The location of my study, as I explained at the beginning of this chapter (page 19), was an ideal teaching environment and not typical of most South African schools. While this class was not representative of most South African music classes, this setting provided an opportunity to experiment with and develop the pedagogy, assessment methodologies, and outcomes of a music class in a way that would have not been possible in a less well-resourced school. By operating in a space that was less constrained by financial, time and institutional limitations, I was able to explore a case that, although may be atypical in the South African context, would enable the outcome of my research questions, once the possibilities of the case were established, to become a model. This model could then be adapted and reimagined in a more typical South African School and indeed in any global context. The methodology used incorporated elements of action-based research and design-based research, but the primary intention of this small, contained study was to provide such a model. The case study was thus the most appropriate methodology to use for this research.

The data that I envisaged collecting included the self-assessments that students would complete after each lesson, as well as my own assessments and observation notes. I intended to film each lesson, so that I could re-watch these classes, as a passive observer rather than an active participant, and take note of evidence of learning. In analysing this data, I was going to look for a sense of improvement (or growing sense of confidence) on the student's part, as a specific competency was explored over and over again. I was also planning to look for a correlation between student and teacher assessments and use this data to inform which types of feedback were most effective in competency development. Another important source of data was to be the 'work product' that students created. This included worksheets, online assessments, scoreboards, mind maps, performances, instrumental karate belt videos, models, and prototypes.

At the end of each term, I planned to conduct focus groups with small groups of students, in order to find out which pedagogical methods students found the most effective, which competencies they felt they had developed the most through music, which they felt they could transfer into other areas of their studies, whether or not in-class feedback and guidance was helpful, and what additional support they felt would have helped their

competency development.

Once I had collected this data, I planned to use triangulation (Olsen 2004, Cohen et al. 2007, McMillan and Schumacher 2014) in order to assess and interpret it. By combining qualitative (observations and focus groups) and quantitative (rubric-based self-assessments, teacher assessments and competency profile maps) data, I hoped that I would be able to have a rich and comprehensive overview of the outcomes of this case study.

Implementing and Running the Case Study: Challenges and Solutions

By the time I had read extensively on the subject of 21st-century competencies, presented papers on the topic at four different conferences, written and had my proposal accepted, and designed the course I would run as my case study, I felt that I was an expert on the topic. I had a clear understanding of why each of these 21CCs was so important and was hyper-aware of my own 21CCs. I challenged myself to practice my analytical skills, interpersonal skills, ability to execute, information processing skills and capacity for change in every situation and felt that I could take on any situation ith this highly developed set of skills. Setting up and running my case study, however, taught me that my skills were not nearly as highly developed as I thought they were. I learnt that there is no end point for the development of these skills – they need to be constantly practiced and developed – and they are even more vital for success in an ever-changing world than I had anticipated.

I ran this case study in my fourth year of teaching at Redhill School. During each of the three previous years I had taught music to every Grade 7 student in two 45-minute lessons each six-day cycle. The cycle rotated so that if there was a public holiday or midterm break, a day of teaching would not be missed, it would simply be pushed onto the next available day. This meant that, in a year I would see each class approximately 60 times, which translated into approximately 45 hours of contact time in a year (see Table 2.9 below).

In October 2018, after I had designed my case study and meticulously planned each activity based on the number and duration of lessons I had come to expect, I was informed that the school was revising the timetable. Now, rather than a six-day cycle, we would follow a 10-day cycle and would miss days of teaching that fell on public holidays or

45

midterm breaks. Lessons would be 55-minutes rather than 45-minutes, but each of the arts subjects would continue to receive just two lessons per cycle. This meant that I would only get to see my class 32 times in the school year. Even though lessons were longer, this translated to just 29 hours of contact time in a year – before accounting for public holidays and midterm breaks (see Table 2.9 below).

The effects that this predicament would have on my case study were of concern, and I was also distressed that my students would receive such limited music tuition. Realising that I needed to be flexible, I decided to put one of my other 21CCs to use: negotiation. After meeting with the Arts Faculty Head and the Executive Head of the School on several occasions, I was able to negotiate an additional lesson each cycle for the arts subjects. Here, students would receive 48 lessons per cycle, resulting in 44 hours of contact time (see Table 2.9 below).

	2016, 2017 & 2018	Proposed 2019	Negotiated 2019
Lesson length	45 Minutes	55 Minute	55 Minute
Length of cycle	6 Days	10 Days	10 Days
Number of lessons per cycle	2 Lessons	2 Lessons	3 Lessons
Number of cycles per year	30 Cycles	16 Cycles	16 Cycles
Number of lessons per year	60 Lessons	32 Lessons	48 Lessons
Contact hours per year	45 Hours	29 Hours	44 Hours

Table 2.9: Expected, Proposed and Negotiated Contact Hours for Music

The decrease from 45 hours to 44 hours of contact time was negligible, but the smaller number of lessons and (particularly) the longer periods of time between lessons, were of concern to me from the outset. The fact that the cycle was fixed to the days of the week also meant that I missed six lessons due to midterm breaks and other school-wide events such as the annual arts festival, RedFest, and the International Benchmark Testing that took place at the school. I therefore decided to compensate for this loss by requesting more instruments. In previous years, Redhill students had had access to a bank of roughly 30 musical instruments that they shared. Students could only access these instruments in class and occasionally would be able to take them home on weekends or over the school holidays. I negotiated for a budget to purchase a larger bank of instruments, thus giving each student access to their own instrument that they could take home in between each lesson. Once I had ascertained the number of lessons I would have during the course of

the year and confirmed that each of my students would have a musical instrument to work on between lessons, I set about redesigning my course. I created a new practical programme that gave me access to students in between our (now) more spread-out lessons. The flipped practical classroom and structured practical programme I developed, which grew out of these unexpected changes, proved to be wonderful learning tools for the students, as it turned out.

Up until 2018, every student studied music in their Grade 7 year. Thus, I anticipated that I would teach, and by extension conduct my case study with, 4 classes of roughly 20 students. In the midst of my negotiations for more contact time with music students, I was informed that in 2019 Grade 7 students would have to select two of the three arts subjects offered by the school: Art, Drama and Music. I did try to advocate for every student to receive a music education, but ultimately sacrificed the numbers battle to win the time war.

Music students were required to pay a levy of R250.00 per term to cover the servicing and maintenance of instruments. Due to this, the school decided that students who did not submit their subject selection forms by the due date would automatically be placed in the Art and Drama classes, as these subjects did not carry any additional fees. No late applications for music would be accepted. This meant that only 23 students took music as a subject in the Grade 7 class of 2019, which was a considerably smaller group than in previous years. Numerous students did try to sign up for music after the deadline, but were refused access to this class, as the timetable had already been set. After seeing the substantial drop in numbers, the school administrators realised that this decision was detrimental to the development of the music department and have subsequently (2020 onwards) been more lenient in allowing students to sign up for the music programme, allowing it to bounce back with a group of 43 students in 2020.

Nevertheless, the 2019 Grade 7 class was capped at 23 students. I initially viewed this as a setback for the research project, but I came to see that a smaller number of research participants than I had anticipated allowed me to delve more deeply into the development of each of my participants. What this smaller class cost in breadth it gave considerably in depth, and allowed me to gain much more insight into the competency development of individual students than I might have observed with a larger group.

A further challenge arrived in the form of obtaining ethics clearance. I submitted my ethics clearance documentation in mid-August 2018, but, in mid-December, was notified that I

needed to clarify the use of video recordings as a means of capturing data in my classroom before ethics clearance would be granted. This clarification was made and submitted at the beginning of January, on the day the REC office opened after the Christmas break. I only received notice that ethics clearance had been granted, however, on the 28th of January 2019, and received my official ethics clearance certificate on the 6th of February 2019, three weeks after the school term had started (see Addendum 1).

Even though I did not yet have ethics clearance, the first day of school arrived and I had to begin teaching. I, therefore, had to disregard the first three lessons of the term. Once ethics clearance was granted, I still had to distribute and collect informed consent forms, and only after this would I be able to conduct the research formally. I began teaching and assessing the students, making notes and collecting evidence of their academic and skill development as a requirement of my teaching job, but I could not film these lessons. I refer to this period as 'Research Cycle 1', below, and report on the observations I made during this period retrospectively (with students' and their guardians' permission). I gave a very large sigh of relief once my case study research could finally get underway, looking forward to focusing on students' 21CC development rather than my own. Little did I know that 3 months later I would find myself missing more of my precious lessons when a medical emergency forced me to take six weeks' leave following major surgery. Fortunately, I was able to overlap this leave with the school holidays, and so I only missed three lessons. Once again, I found myself redesigning and restructuring my course, searching for more ways to cover all of my intended content in fewer and fewer lessons.

These major setbacks, as well as the smaller hurdles I encountered on a weekly, and sometimes daily, basis throughout my case study, taught me everything that I had read about: the ability to be adaptable and flexible; the ability to think critically about a situation and solve problems, scouring resources for solutions to problems; the ability to negotiate with those around you to find the best possible outcome in difficult situations; the ability to persevere with grit and resilience; and the capacity to remain creative and innovative. The competencies I rapidly developed were essential to my success as a teacher, and I was not alone in this. Every teacher in my school had to deal with the same unexpected timetabling changes. I was hypersensitive to them because of my case study and having to carefully document every moment of the year made this an incredibly high-stakes teaching year, but every teacher needed to adapt and redesign, finding creative solutions to various problems.

I finished my case study in November 2019 relieved that it was over and proud of the personal growth I had achieved through the process of running this experiment. I had even enjoyed being pushed and stretched in new ways but was looking forward to smoother sailing in 2020, a year of teaching without the pressures of running a case study. I was right – for the first two months of the year – where the odd missed lesson and unseen obstacle were shrugged off and did not require serious revision of a meticulous plan.

Then the Covid-19 pandemic hit South Africa, and we were catapulted into a strict lockdown that necessitated a complete revision of my entire curriculum and course structure, and the acquisition of many new and disparate skills for online teaching. I had not expected to see such a violent and immediate demonstration of these 21CCs in use by my colleagues and students, and yet again, I was reminded just how critical, how flexible, and how creative one needs to be in the 21st century. In my immediate environment, I watched my colleagues find creative and innovative solutions to the problems of teaching online. Research on best practice was found, critically analysed and shared using the new communication tools we discovered. Students had to exercise new levels of self-regulation, self-direction, perseverance, and responsibility, as they took charge of their learning from their own homes.

I was rarely without a printed copy of my 21CC Framework (Table 2.1, Page 29) as I sat writing up my PhD in between online classes and was amazed to see every one of these competencies practiced, exercised and developed on a daily basis.

Table 2.10 below provides a retrospective overview of the work that took place during the case study. I will explain each of the activities shown in this table in Chapters 3, 4, 5 and 6.

			Lesson	Instructional Strategy	Teaching Goals	Research Goals
JAN	**Cycle 1**	1	Introduction to Music			
		2	Instrument Experimentation		Performance	
		3	Instrument Allocation		Performance	
		4	Music Elements Treasure Hunt	Gamification	Overview of Elements	Research & Inquiry, Interpretation, Communication, Collaboration, Initiative, Productivity, Self-Regulation, Information Literacy, Flexibility
FEB		5	Elements of Music Mind Map	Jigsaw	Overview of Elements	Research & Inquiry, Interpretation, Communication, Collaboration, Responsibility, Productivity, Self-Regulation, Information Literacy, Flexibility
		6	Listen and Compare Exercise	Think-Pair-Share	Overview of Elements	Critical Thinking, Interpretation, Communication, Productivity, Self-Regulation
		7	Kahoot and Peer Tutoring	Gamification	Pitch	Problem Solving, Communication, Empathy, Self-Regulation, Information Literacy, Creativity, Flexibility, Metacognition, Curiosity
		8	Clapping Games	Gamification	Rhythm, Meter, Tempo	Interpretation, Self-Presentation, Perseverance, Self-Regulation, Information Literacy, Metacognition
			Lesson Missed – Midterm Break			
		9	White Belt Check-In	Flipped Classroom	Performance	Problem Solving, Self-Presentation, Perseverance, Information Literacy, Metacognition
MAR	**Cycle 2 – Phase 1**	1	Instrument Classification	Class Discussion	Instrumentation	Critical Thinking, Problem Solving, Decision Making, Reasoning & Argumentation, Interpretation, Communication, Collaboration, Initiative, Perseverance, Responsibility, Self-Regulation, Information Literacy, ICT Operations & Concepts, Creativity, Innovation, Curiosity
		2	Intro to Project and Play	Free Play	Instrumentation	
		3	Design 1	PBL	Instrumentation	Critical Thinking, Problem Solving, Decision Making, Reasoning & Argumentation, Interpretation, Communication, Collaboration, Initiative, Self-Direction, Productivity, Perseverance, Responsibility, Self-Regulation, Information Literacy, ICT Operations & Concepts, Creativity, Innovation, Flexibility, Metacognition, Curiosity
		4	Design 2	PBL	Instrumentation, Timbre	
		5	Design Presentation 1	PBL	Instrumentation	Critical Thinking, Problem Solving, Communication, Self-Presentation, Self-Regulation, Information Literacy, ICT Operations & Concepts, Creativity, Innovation, Metacognition
		6	Design Presentation 2	PBL and P4C	Instrumentation	
		7	Design Presentation 3	PBL	Instrumentation	
APR			Term 1 Focus Groups			
		FC	Karate: Yellow Belt Due	Flipped Classroom	Performance	Problem Solving, Self-Presentation, Perseverance, Information Literacy, Metacognition
			Lesson Missed – Medical Leave			
			Lesson Missed – Medical Leave			
			School Holidays			
			Lesson Missed – Medical Leave			
MAY	**Cycle 2 – Phase 2**	FC	Karate: Orange Belt Due	Flipped Classroom	Performance	Problem Solving, Self-Presentation, Perseverance, Information Literacy, Metacognition
		1	Feedback Lesson	PBL	Instrumentation	Critical Thinking, Problem Solving, communication, Collaboration, initiative, Self-Direction, Productivity, Perseverance, Responsibility, Self-Regulation, Information Literacy, ICT Operations & Concepts, Creativity, Innovation, Flexibility, Metacognition, Curiosity
		2	Construction Lesson 1	PBL	Instrumentation	
		3	Construction Lesson 2	PBL	Instrumentation	
		4	Construction Lesson 3	PBL	Instrumentation	
		5	Construction Lesson 4	PBL	Instrumentation	
JUN		6	Construction Lesson 5	PBL	Instrumentation	
		7	Construction Lesson 6	PBL	Instrumentation	
		8	Final Presentation 1	PBL	Instrumentation	Reasoning & Argumentation, Communication, Self-Presentation, Responsibility, Self-Regulation, Information Literacy, ICT Operations & Concepts, Metacognition, Curiosity
		9	Final Presentation 2	PBL	Instrumentation	
		FC	Karate: Green Belt Due	Flipped Classroom	Performance	Problem Solving, Self-Presentation, Perseverance, Information Literacy, Metacognition
			Lesson Missed – Midterm			
			Lesson Missed – Midterm			
JUL			Lesson Missed – Core Exams			
			Lesson Missed – Core Exams			
			Lesson Missed – Core Exams			
			Lesson Missed – Research Project			
			Lesson Missed – Research Project			
		10	Ensemble Lesson 1	Practical	Performance, Melody, Harmony	Problem Solving, Self-Presentation, Perseverance, Responsibility, Self-Regulation, Information Literacy, Metacognition
		11	Ensemble Lesson 2	Practical	Performance, Tonality, Texture	
AUG			Term 2 Focus Groups			
			School Holidays			
SEP	**Cycle 3**	28	Catch Up and Blue Belt	Flipped Classroom	Performance, Dynamics, Articulation, Character	Problem Solving, Self-Presentation, Perseverance, Information Literacy, Metacognition
		29	Elements of Music Revision	Think-Pair-Share	All Elements	Critical Thinking, Interpretation, Collaboration, Productivity, Responsibility, Self-Regulation, Information Literacy, Curiosity
		30	Sample Match	Think-Pair-Share	All Elements	Critical Thinking, Interpretation, Communication, Responsibility, Self-Regulation, Information Literacy, Curiosity
		31	Court Case Preparation	PBL	All Elements	Critical Thinking, Research & Inquiry, Reasoning & Argumentation, Communication, Collaboration, Initiative, Self-Direction, Productivity, Responsibility, Self-Regulation, Information Literacy, Media Literacy, Creativity, Metacognition, Curiosity
		32	Court Case Arguments 1	PBL	All Elements	Critical Thinking, Reasoning & Argumentation, Interpretation, Communication, Self-Presentation, Self-Regulation, Information Literacy, Media Literacy, Creativity, Flexibility
		33	Court Case Arguments 2	PBL	All Elements	
OCT			Lesson Missed – RedFest			
			Lesson Missed – IBT			
		34	Court Case Arguments 3	PBL	All Elements	
		FC	Karate: Purple Belt	Flipped Classroom	Performance	Problem Solving, Self-Presentation, Perseverance, Information Literacy, Metacognition
			Lesson Missed – SU Seminar			
		35	Ensemble Lesson 3	Practical	Performance	Problem Solving, Self-Presentation, Perseverance, Responsibility, Self-Regulation, Information Literacy, Metacognition
			Lesson Missed – Midterm Break			
			Term 3 Focus Groups			
		36	Ensemble Lesson 4	Practical	Performance	Problem Solving, Self-Presentation, Perseverance, Responsibility, Self-Regulation, Information Literacy, Metacognition
	Assessment	37	Class Test	Practical	Performance	Problem Solving, Communication, Collaboration, Empathy, Initiative, Self-Direction, Productivity, Perseverance, Responsibility, Self-Regulation, Information Literacy, Metacognition
NOV		39	Exam	Practical	All Elements, Performance	Critical Thinking, Problem Solving, Communication, Collaboration, Empathy, Self-Presentation, Initiative, Productivity, Responsibility, Self-Regulation, Information Literacy, Metacognition

Table 2.10: Case Study Overview

Chapter 3 – Research Cycle 1

Research Cycle 1, which lasted from 17 January to 28 February 2019, was concerned with preparatory work for the research project. I used this time to get to know and establish baseline competency profile maps for each of the students. This cycle consisted of nine lessons, as shown in Table 3.1 below. The larger context that this research cycle fits into can be seen at the end of Chapter 2 in Table 2.10.

Lesson 1	17 January 2019	Getting to Know Each Other
Lesson 2	23 January 2019	Instrument Experimentation
Lesson 3	28 January 2019	Instrument Allocation
Lesson 4	31 January 2019	Elements of Music: Treasure Hunt
Lesson 5	06 February 2019	Elements of Music: Mind Map
Lesson 6	11 February 2019	Elements of Music: Listen and Compare
Lesson 7	14 February 2019	Pitch: Kahoot and Peer Tutoring
Lesson 8	20 February 2019	Rhythm, Meter and Tempo: Clapping Games
Lesson 9	28 February 2019	Instrumental Karate: White Belt Check-In

Table 3.1: Research Cycle 1 Lessons

The first few lessons of a new school year (January to December in South Africa) are always occupied by administrative tasks. For my 23 Grade 7s in January 2019, these included allocating and renting instruments; ensuring that students had set up their school email accounts, so that they could access the online platform we would be using; explaining classroom etiquette and policies; and, uniquely in this classroom setting, explaining the research that I would be doing and the ethical clearance I would need from students and their parents. As I explained in Chapter 2, there was a brief hold up with obtaining ethical clearance. Although I received informed consent to include observations from every class of the school year from all 23 students, I could not collect data until I had received formal notice that ethical clearance had been granted (28 January 2019) or film classes until all informed consent forms had been returned (28 February 2019). The observations made between 28 January and 28 February 2019 were recorded in writing, and in line with my duties as a teacher. I also captured some still images during this period, as is common practice at Redhill School. These images are traditionally used as illustrations in internal professional development sessions and published on the school's social media accounts with parents' permissions, and a few have been included here with permission.

Presentation of the Data

In this chapter, I provide the "detailed, rich descriptions of situations and their context" that are associated with case studies (Sammut-Bonnici and McGee 2015, 2). It would be impossible to capture every moment in the class in this PhD, so I have selected examples and moments that demonstrate the competency development with which my research questions are concerned.

At the beginning of each lesson description (from Lesson 4 onwards) below, I highlight my research goals by placing them in a box (window) before describing the lesson, explaining my observations and listing my findings. The data collected throughout this cycle, and those that follow, was collated to construct the competency profiles I will present when analysing the results of each cycle at the ends of Chapters 3 to 6, and in the analysis of the research findings in Chapter 7.

Lesson 1: Getting to Know the Students (17 January 2019)

During our first lesson together, the 23 students introduced themselves and shared some background about their lives and musical experiences. All but two were born in 2006, the two youngest being born in early 2007, making the participants all 12-turning-13 during the research period. Nine were girls and 14 were boys (Figure 3.1), a rather different ratio from school or national statistics (Figures 3.2 and 3.3)[3] where there is a more equal gender distribution.
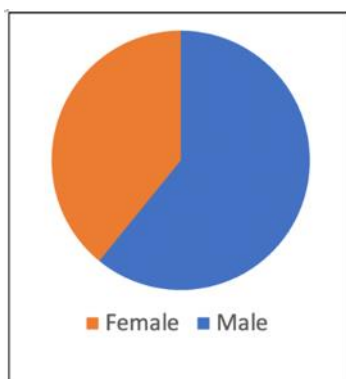
Figure 3.1: Case Study Participants Gender Demographics
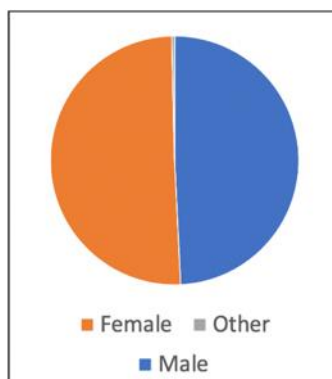
Figure 3.2: Whole School Gender Demographics 2019 (adam.redhill.co.za).
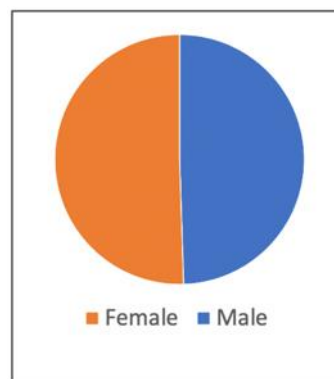
Figure 3.3: South Africa Gender Demographics 2016 (www.statssa.gov.za)

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[3] Two students at the school identify as 'non-binary'. The South African demographic statistics did not provide any information on gender identifications other than male and female.

The class contained students from all four of the major ethnic groups as defined by the South African Government (www.statssa.gov.za) in the ratio shown in Figure 3.4, which is close to the school ratio shown in Figure 3.5. As discussed in Chapter 2 (see page 20), neither are representative of South Africa's racial demographics as a whole (Figure 3.6), however, a factor that reflects the socioeconomic standing of families able to send their children to a private school, as well as South Africa's apartheid legacy that still excludes a large black majority from the kind of education offered by a school like Redhill.
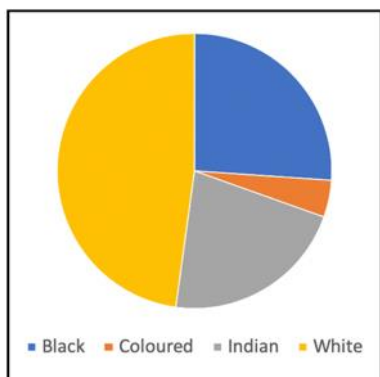
Figure 3.4: Case Study Participants Racial Demographics
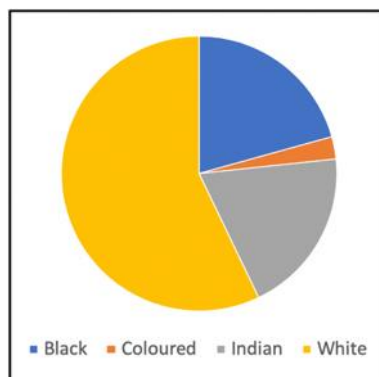
Figure 3.5: Whole School Racial Demographics (adam.redhill.co.za)
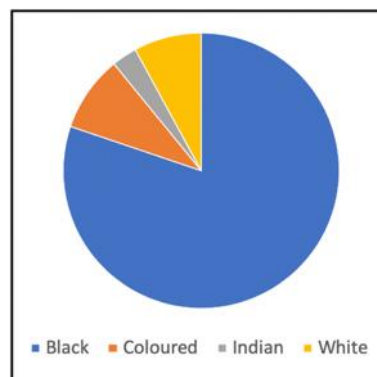
Figure 3.6: South African Racial Demographics (statssa.gov.za)

Of the 23 students, 10 were continuing instrumental lessons taken the previous year, with three of those taking two instruments. Six had stopped taking lessons some time before joining this music class, while the remaining seven had never had the opportunity to play an instrument before (apart from the experimentation provided in the senior preparatory phase of music at Redhill), as shown graphically in Figure 3.7. Ten of them had received some form of music theory tuition before, while the remaining thirteen students were unable to read music (Figure 3.8). This already made for a very mixed-ability group, musically.
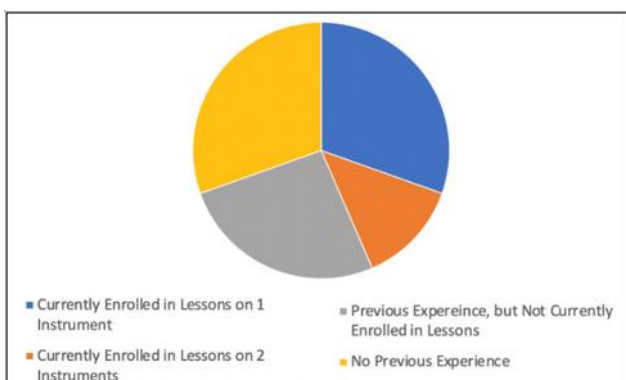
Figure 3.7: Case Study Participants Previous Practical Musical Experience
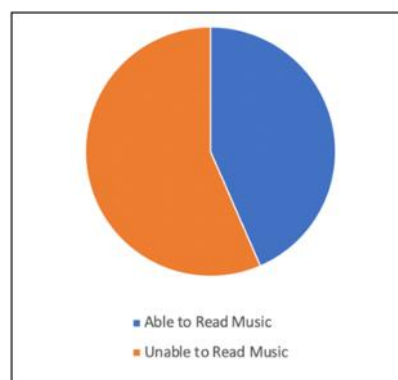
Figure 3.8: Case Study Participants Previous Theoretical Musical Experience

By the same token, this small group had sufficient diversity of musical and cultural experience, I felt, to enable me to explore the issues my research raised (see Chapter 1, page 7).

Lesson 1 Continued: Introducing Myself and My Research to the Class

Once each student had had the opportunity to introduce themselves, I introduced myself to the class. This was not just a brief, 'this is me', but an overview of how I came to conduct the research project I was going to do with them during the year. I recounted my musical background, explaining how I, like many of them, had started playing recorder in my first year of primary school before moving onto piano and then flute. For high school, I attended the National School of the Arts in Johannesburg where I had been able to focus on music studies and play with various orchestras and ensembles. I had then studied music at the University of the Witwatersrand, Johannesburg (Wits) and had had my sights set on a career as a performer. A hand injury necessitated an abrupt change of plans, and my foray into composition quickly went from a means to complete my music degree to a new-found passion that allowed me to collaborate with fantastic musicians and attend several national and international music festivals and residencies.

I completed a master's degree in composition at Wits and enjoyed a regular stream of commissions and performance opportunities. Throughout my studies and into my early career as a composer I taught individual instrumental lessons to earn a steady income, but then I gradually became more and more interested in music pedagogy. When an opportunity to take on a full time teaching role became available, as the head of the department of one of the schools where I worked as a peripatetic teacher (I explained to the class), I decided to switch from full-time-composer/part-time-teacher to full-time-teacher/part-time-composer. Since I had no formal qualification as an educator (in South Africa this would mean completing an additional two-year course in another designated teaching subject at undergraduate level and then a year-long post graduate certificate of education), I took it upon myself to read everything I could find regarding music education. I soon noticed some interesting areas for potential research, notably 21st-century competencies, and began presenting papers at various local and international conferences. The response was so positive that I decided to pursue a PhD in Music Education.

I described to the class how I became interested in the idea that studying music helped students develop extramusical skills such as the following: commitment to a goal with an intention to practice; understanding how personal success is often tied to the success of others; and social and emotional development. These could help them in the future and beyond the sphere of music, and I wanted to test this idea – on this class – so that I could share my findings with other teachers. I made sure that they understood that their participation in the study was entirely voluntary and that it would not make a difference to the way I normally taught this class, but that in addition, I would record and write about their progress in acquiring these extramusical skills and, once a term, would ask them for some feedback. I also explained that I would be recording our classes at some point with a video camera to help me keep track of what we did and said in class. I provided each student with a Minor Informed Consent Form and a Parent/Guardian Informed Consent Form as well as a letter that explained my research objectives in detail. I also emailed these documents to the students' parents or guardians (see Addendum 2).

The class's response was immensely positive. Every student, with the blessing of their parents, was willing to participate in the study; no-one wanted to opt out. On the contrary, they were all very keen to be part of a 'research project' and numerous parents expressed an interest in reading the study once it was completed and were appreciative of the interim results and feedback I sent to them later. The students were also excited about the prospect of their class work being written and spoken about and came to view themselves as co-researchers rather than participants, always happy to share their insights on their process and progress.

Lessons 2 and 3: Selecting an Instrument (23 and 28 January 2019)

Once the students and I had got to know one another, they had to decide which instrument they wanted to play. During their second lesson, I allowed them to listen to and experiment on all the instruments available through the school's musical instrument 'lending library'. Redhill School has an abundance of orchestral and other instruments, but in the system of allocation, senior students always take precedence, and so this class, the youngest in high school, were 'left' with seven flutes, five clarinets, four saxophones, three trumpets, five trombones, and two euphoniums: riches beyond compare for most schools in South Africa, but in the context of Redhill, some students were disappointed that the string instruments had already gone. I explained that learning to play *any* instrument was valuable, and the

reading, aural, and ensemble skills they would develop could be transferred onto another instrument if they chose to switch instruments the following year, when they had a greater selection to choose from. After trying each instrument, students were sent home with a rental agreement letter (Addendum 3) and asked to think about which instrument they would like to play, and discuss their choice with their parents.

I gave students already taking individual music lessons with a private teacher the option to select a new instrument or continue on the one they were already learning. Two students, who already played piano and violin, and piano and French horn, respectively, at first wanted to take up a new instrument, but their parents and instrumental teachers felt this would put too much pressure on them, and would distract them from the exam and competition repertoire they were learning on their main instruments. In the end, eight of the 10 students already receiving private tuition selected to continue with that instrument in the class ensemble.

The remaining 15 students selected a new instrument, and there was much discussion around the selection. Groups of friends seemed to want to play the same instrument, and while some students had initially seemed interested in something else, they changed their decisions to fit in with the group. This caused logistical problems and the assignment of instruments became quite difficult. A simple administrative task to be completed before my research began developed into a conflict that provided a great deal of early insight into interpersonal relations and capacity for change. As I show below, how each student came to play their instrument illustrated the baseline of the students' competencies.

I started the third lesson on the 28th of February 2019 by writing a list of students'' names on the board and asking them to call out which instrument they wanted to play. Nine students had their hearts set on learning the alto saxophone, but after I explained that there were only four available, two students volunteered to switch to the clarinet, happy that I said that the techniques were similar and it would be easy to move to the saxophone the following year. The remaining seven students were adamant that they wanted to play the saxophone. I asked the whole class to weigh in on the challenge set out before us and used the opportunity to introduce the ideas of interpersonal skills and capacity for change, asking students what they thought 'negotiation' and 'empathy' were. At this point, we had not yet unpacked the idea of 'self-regulation' and, given the excitement of receiving a new instrument they could take home and the emotional distress of potentially not receiving their chosen instrument, the students were very distractible and unable to focus on the

discussion for more than a minute at a time. They struggled to generate definitions for 'negotiation' and 'empathy' and I eventually explained that 'negotiation' was the act of working together to build consensus and reach an agreement, while 'empathy' was the act of temporarily suspending your own ideas and judgements, while listening closely to and entertaining someone else's ideas. I realised that these two new concepts were already more than the students could handle, and after unpacking the definitions further, I asked them to come up with potential solutions to the problem of four saxophones for seven eager saxophonists.

I had hoped for meaningful discussion and compromise, but instead, the students suggested that they "should all just quit music and do art instead" or "they should fight each other to the death!". They finally agreed to draw straws. As four happy students waved their long strips of paper in the air, two looked dejectedly at their short strips, another sobbed inconsolably until one of the happy four felt sufficiently guilty to swap his long piece of paper for his friend's short one, I began to realise that the task of making a tangible and measurable contribution to the development of these students' 21st-century competencies would be no small feat.

Once the dust had settled, 14 students had selected new instruments, eight had elected to continue with an instrument they were already learning, and one chose to revisit the violin, an instrument she had learnt when she was six years old and still had at home. All those who had been learning an instrument before the course had completed a practical Grade'examination through Trinity College London (TCL) or The Associated Board of the Royal Schools of Music (ABRSM). Table 3.2 shows which instrument each child selected and at what level they were at the beginning of 2019. I asked students who played more than one instrument to select which one they would use in class (shown with an asterisk). The names are not real names, but pseudonyms chosen by the students after I explained to them (and their parents) that their identity would not be revealed in my research findings.

Once instrument allocation and other administrative tasks had been completed, I introduced the idea of the 'flipped classroom' (see page 40) and the 'instrument karate' system (introduced in Chapter 2), before beginning the first research cycle. A brief explanation of these educational tools follows.

Diale	Saxophone	Beginner
Priya	Piano *Violin	Completed TCL Grade 5 Completed TCL Grade 4
Paul	Clarinet	Beginner
Pelo	Saxophone	Beginner
Mike	Trombone	Beginner
Mia	Trumpet	Completed ABRSM Grade 3
Ethan	Trombone	Beginner
Nandi	Clarinet	Beginner
Kate	Piano *Violin	Completed ABRSM Grade 8 Completed ABRSM Grade 7
Josh	Clarinet	Beginner
Travis	Flute	Beginner
Dinka	Guitar	Complete TCL Rock & Pop Grade 1
Jack	Trumpet	Completed ABRSM Grade 2
Ben	Guitar *Euphonium	Complete TCL Rock & Pop Grade 3 Beginner
Vuyo	Saxophone	Beginner
Sameer	Flute	Beginner
Nthabi	Piano *Saxophone	Completed ABRSM Grade 4 Beginner
Kevin	Clarinet	Voice
Emma	Violin	Had taken lessons between ages of 6 and 7.
Trinesh	Trumpet	Completed ABRSM Grade 3
Kylesh	Trumpet	Completed ABRSM Grade 1
Lesedi	*Piano French Horn	Completed ABRSM Grade 7 Completed ABRSM Grade 5
Tim	Clarinet	Beginner

Table 3.2: Case Study Participants and Instruments

Use of Instrument Karate and the Flipped Classroom in Instrument Teaching

The blended learning tool of a flipped classroom helped me to capitalize on the sometimes slighty extended time between classes. This model essentially reverses traditional classroom activities and homework activities. As Slomanson explains:

> In the traditional classroom, [teachers] spend the majority of their time dispensing information. The students spend the majority of their class time taking notes. [Teachers] have little time to help them connect the analytical dots. In the flipped model, new content is presented in online, out-of-class videos. Class time may then focus on activities enhancing the overall learning environment (2014, 95).

I found this method particularly useful for instrumental teaching, in that it allowed me to provide instrument-specific instruction online to 23 students playing various instruments. For this instruction I adapted Philipak's Recorder Karate Method (2002) to violin, flute, clarinet, saxophone, trumpet, trombone, and euphonium. This "self-paced recorder

instruction method" (Fielding 2017) provides students with a scaffolded introduction to their instrument. The opportunity to receive small ribbon belts, that could be pinned onto a blazer gamified this segment of the course, by adding an element of competition and 'awards' to the learning process. Philipak's method is aimed at younger students and expects them to play one folk song for each of the belts and so I adapted the method to cater for more difficult instruments (in terms of producing sound) than the recorder and to challenge older students, encouraging them to reach a higher level of playing with each belt. The table below illustrates the practical musical skills associated with these belts as well as the due dates for the submission on these task:

White Belt	Correctly assemble and create a sound on your instrument	28 February 2019
Yellow Belt	Play 5 pieces that make use of crotchets, minims and semibreves, using the first three pitches on the instrument.	3 April 2019
Orange Belt	Play 5 pieces that make use of crotchets, minims and semibreves, using the first five pitches on the instrument.	13 May 2019
Green Belt	Play 5 pieces that make use of quavers, crotchets, minims and semibreves, using the first five pitches, as well as the flattened third, on the instrument.	19 June 2019
Blue Belt	Play 5 pieces that make use of quavers, crotchets, minims and semibreves, using the first five pitches, as well as the flattened third, on the instrument. Follow basic articulation and dynamic indications.	4 September 2019
Purple Belt	Play 5 pieces that make use of quavers, crotchets, minims and semibreves, using the full major scale on the instrument. Follow basic articulation and dynamic indications.	10 October 2019
Brown Belt	Play 5 pieces that make use of quavers, crotchets, minims and semibreves, using the full major scale on the instrument. Follow basic articulation and dynamic indications. Perform these pieces in front of the class or in a break time concert.	Extension Work
Red Belt	Join one of the school's ensembles. Attend weekly rehearsals and participate in their concerts and showcases.	Extension Work
Black Belt	Complete you Grade 1 Trinity College or ABRSM exam on your instrument.	Extension Work

Table 3.3: Instrument Karate Programme and Due Dates

I produced videos for each belt on every instrument, explaining and demonstrating the skills they had to learn. Students were provided with an accompanying book that contained written instructions, self-assessment rubrics, and sheet music. Once they had watched the video, practiced the pieces associated with a particular belt, and felt that they had mastered these pieces, they recorded a short video of themselves performing the pieces. They also completed a self-assessment where they reflected on their learning

process. These videos were submitted online and I was able to watch, assess, and comment on each student's performance.

The flipped classroom model enabled me to cover more content and give more in-depth feedback in the form of written comments and even recorded demonstrations, than conventional class practical teaching allows. Another benefit of the flipped classroom model is that it allows students to move at their own pace. As Collins and Halverson comment:

> Deeply ingrained in the structure of schooling is a mass-production notion of uniform learning. This belief stipulates that everyone should learn the same things at the same time. But one of the great advantages of technology is customization. Computers can respond to the particular interests and difficulties that learners have and provide content on any topic of interest (2009, 2).

Some students forged ahead and made very quick progress through the belts, therefore, while other students were free to take the time they needed to master skills they found particularly challenging. And at the same time, while students were learning to play their musical instruments in between lessons I was able to conduct an exciting and rigorous programme during them. In Lesson 3, then, I explained how the karate system and flipped classroom worked, adding that I expected the students to complete their 'White Belt' by the end of the first research cycle (28 February 2019). I discuss the results of this work towards the end of this chapter.

Lesson 4: Elements of Music Treasure Hunt (31 January 2019)

From Lesson 4 onwards, I had ethics clearance and could record my goals and observations officially. From here on, then, I regularly present my research goals as a window and thereafter describe my observations and findings for each lesson. The first official teaching lesson of the first research cycle dealt with the formation of definitions for each element of music.

Research Goals for Lesson 4				
• How do students deal with large amounts of contradictory information? • To what extent can students illustrate conceptual understanding? • Are students able to interpret information delivered through different media? • How do students react to working in an unusual manner and setting? • Are students able to work effectively in groups? • To what extent can students control their own behaviour in order to complete a task in an allotted time?				
Analytical Skills	**Interpersonal Skills**	**Ability to Execute**	**Information Processing**	**Capacity for Change**
Research & Inquiry Interpretation	Communication Collaboration	Initiative Productivity Self-Regulation	Information Literacy	Flexibility

The elements of music constituted the 'foundational knowledge' learning goals of the lessons in Cycle 1 (after Fink 2003, as explained in Chapter 1), while the 'application' learning goals of these lessons were research and inquiry, interpretation, communication, collaboration, initiative, productivity, self-regulation, information literacy, and adaptability. In order to disguise and minimise the multiplicity and potentially daunting quality of these goals, the content of the first lesson was gamified and turned into a treasure hunt. It made the exercise more engaging for students and provided several distractions that allowed students opportunities to work on their ability to execute skills. I divided the class into groups by drawing different coloured pieces of paper out of a hat (blue, green, yellow, orange, purple, red – not to be confused with the colour coding of the five 21CC frameworks) and then assigned each group five elements of music to define. I had already compiled three videos of varying quality, clarity, and accuracy that demonstrated, explained, and gave definitions of each element. I had also generated trigger images containing the names of each element that were placed in and around the music department. Students used these and the web-based augmented reality application, Aurasma/HPReveal[4] on their portable devices to access the video content.

After watching the videos, students tried to write a definition for each element, in their own words, working collaboratively in their group. The students were asked to record their answers on a shared Google Doc that all group members could access and edit. This exercise was completed with varying degrees of success in the different groups. The Blue Team consisted of Diale, Kate and Ethan. Kate was already at Grade 7 (piano ABRSM) and Grade 8 (violin ABRSM) level while Diale (saxophone) and Ethan (trombone) were

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[4] Aurasma is "image recognition technology [that] uses a smartphone's or tablet's camera to recognize real world images and then overlay media on top of them in the form of animations, videos, 3D models and web pages" (Auganix).

beginners. Diale worked through the task with enthusiasm but his team-mates found the collaborative aspect challenging: Ethan, watching the videos alongside Diale, was more easily distracted, and because Kate thought she already knew how to define the elements, she told the others to work out their own answers, as she was unwilling to let them take credit for 'her work'. After I addressed this issue with Kate, she re-joined her group and contributed to their definitions. They managed to provide a definition for each element but struggled to move from concrete examples to defining the elements in the abstract. I observed a similar tendency in the Green Team, Sameer and Pelo. Sameer exclaimed as he listened to the beginning of one of the videos, "I know this – I don't need to watch the video". Figure 3.9 shows the responses they gave on their worksheet: the concepts are not yet fully formed – tonality is equated with key or scale, for example – although this shows a move towards the conceptual, and they do distinguish clearly between elements.

GREEN TEAM

Team Members:			

Rhythm   It is a consistent beat

Tonality Tonality is minor and major. Minor equalis a very spooky sound and then major is a very happy sound

Melody   Melody is notes put together to make a sound

Texture   A few notes scattered around and put together

Articulation Legato is a slur smoothly playing . Staccato is when you leave a very tiny space after each notes.

Figure 3.9: Musical Elements Treasure Hunt Worksheet Completed by the Green Team.

The Yellow Team, which consisted of Dinka, Trinesh and Kylesh, worked diligently, but kept working individually rather than collectively. When I asked them why, it turned out that, in an attempt to not miss any important information, they were screen-capturing each of the videos that were triggered through the app so that it was recorded and stored on their own devices. This preoccupation with capturing every bit of information distracted them from absorbing it, however, leaving them unable to provide definitions for the elements they were assigned. The Orange Team, Nthabi, Kevin and Paul, worked

productively together throughout the lesson, managing their time well and engaging in healthy debate. Not surprisingly, they came up with the most accurate and conceptual set of definitions, as Figure 3.10 shows.

Figure 3.10: Musical Elements Treasure Hunt Worksheet Completed by the Orange Team.

More important than how I thought they managed this first task was how they thought they did, which is why I conducted both self and 'teacher' assessments at the end of each task. As mentioned in Chapter 2, I captured my observations on a rubric I specifically designed for each lesson, based on the competencies I expected to see. I cannot mention all 23 students in each of my lesson descriptions, but I did observe each student and rate the competencies he or she displayed as 'emerging', 'developing', 'proficient' or 'exemplary'.

The students also had the opportunity to assess themselves using the same standards and criteria at the end of each lesson. These self-assessments were initially conducted online using Google Forms, but I found that students regularly failed to submit their self-assessments, citing technical difficulties. I persisted with this method throughout the first research cycle, but switched to paper-based self-assessments from the second research cycle. I will discuss this shift and the impact of this change in Chapters 4, 5 and 7.

I explained in Chapter 2 (page 38) how student self-assessment and teacher observation rubrics clearly defined what constituted 'emerging', 'developing', 'proficient' or 'exemplary' competency. I carried around a note pad, a list of my standards and criteria, and a table

(reproduced in Table 3.4 below), in order to capture my observations during class. I developed a shorthand where I used a letter or two to easily denote each competency: E: 'emerging'; D: 'developing'; P: 'proficient'; Ex: 'exemplary'. Table 3.4 also illustrates the results from individual (not group) self-assessments that students were expected to complete online after the task.

	Teacher Assessment									Self-Assessment				
	Research & Inquiry	Interpretation	Communication	Collaboration	Initiative	Productivity	Self-Regulation	Information Literacy	Adaptability	Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Mike	E	E	E	E	E	E	E	E	E	P	D	P	D	P
Jack	E	E	E	E	E	E	E	E	E	D	D	D	D	D
Ben	E	E	E	E	E	E	E	E	E	P	P	P	P	P
Diale	D	D	D	D	P	P	P	D	D	P	P	Ex	P	P
Kate	D	P	E	E	D	P	P	P	E	Ex	P	Ex	Ex	Ex
Ethan	E	E	E	E	D	E	D	E	E	No self-assessment submitted				
Vuyo	D	E	D	D	P	P	P	E	D	No self-assessment submitted				
Tim	D	E	D	D	P	P	P	E	D	No self-assessment submitted				
Sameer	E	E	D	D	P	P	D	D	D	Ex	Ex	Ex	Ex	Ex
Pelo	E	E	D	E	D	D	D	D	E	No self-assessment submitted				
Priya	D	D	D	D	D	P	P	D	D	Ex	Ex	Ex	Ex	Ex
Emma	E	E	E	E	E	E	D	D	E	No self-assessment submitted				
Mia	P	P	D	D	P	P	P	D	D	P	D	P	P	P
Lesedi	D	P	D	D	P	P	P	D	D	P	Ex	P	Ex	Ex
Dinka	E	E	D	E	D	E	D	D	E	D	P	P	D	P
Trinesh	E	D	D	E	D	E	D	D	E	P	P	P	P	P
Kylesh	E	E	D	E	D	E	D	D	E	D	D	D	D	D
Kevin	D	D	D	D	D	P	P	D	D	P	P	P	P	P
Nthabi	D	P	D	D	D	P	P	D	D	P	P	P	P	P
Paul	E	E	E	E	E	D	D	E	E	No self-assessment submitted				
Josh	Absent									Absent				
Nandi	Absent									Absent				
Travis	Absent									Absent				

Table 3.4: Teacher Assessments and Self-Assessments of Treasure Hunt Task.

As you can see, six of the 23 students failed to submit a self-assessment for this lesson and those who did submit a self-assessment generally overestimated their abilities. Students' inability to accurately assess their own performance was noted throughout the first research cycle. Nevertheless, I persisted with self-assessments and as students'' analytical skills developed, so too did their self-assessments. I will do an in-depth analysis of this improvement in Chapters 4 and 5.

A document like the one shown in Table 3.4 was produced for every lesson, throughout the case study, but I will not present all of these documents here. I used this data in the construction of the competency profiles I present when analysing the results of each cycle at the ends of Chapters 3, 4, 5 and 6, and in the analysis of the research findings in Chapter 7.

Lesson 4: Findings

In addition to individual competency standards that I recorded on the rubrics, I recorded other findings. As I had discovered during the first lesson of this cycle, the students in my class had vastly different backgrounds and ability levels when it came to music. Students who possessed some background musical knowledge seemed to resent the idea that they were expected to share it with teammates who had none. Several of these students also indicated that they felt that they did not have to watch the online content, as they already knew how to define their assigned elements. In some cases, this resulted in poorly defined concepts that relied heavily on examples. This inability to move away from examples and provide abstract concepts was noted in most of the students' work.

I was also struck by how differently the students reacted to a new style of learning activity. While some students approached the task in a diligent and conscientious manner, others were thrown, and failed to work sensibly and productively. Some students had fun rushing around the music department looking for their trigger images; others seemed to let their concern that they had to get everything 'right' hamper completion of work.

Self-regulation or lack thereof had an effect on the presentation of each of the other competencies. In some instances, I wondered if students actually had more developed analytical and information processing skills than I was able to observe, but these competencies were masked by their inability to regulate their own behaviour and complete their work.

General findings like these, which I recorded throughout the case study, influenced the way in which I planned for and presented each ensuing lesson. As much as I had planned them in advance to some extent, I felt that it was important to remain adaptable to students' development, so that I could make adjustments as needed.

Lesson 5: Elements of Music Mind Map (6 February 2019)

Research Goals
Continued from previous lesson:
• To what extent can students illustrate conceptual understanding?
• How do students react to working in an unusual manner and setting?
• Are students able to work effectively in groups?
• To what extent can students control their own behaviour in order to complete a task in an allotted time?
Additional questions for Lesson 5:
• To what extent are students able to switch between the roles of peer mediator and learner in their groups?
• Are students able to succinctly explain concepts to one another in order to generate a thorough understanding?
• What is the role of discussion in generating understanding?
• How will students react to the responsibility of being considered a specialist in certain areas?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Research & Inquiry Interpretation	Communication Collaboration	Responsibility Productivity Self-Regulation	Information Literacy	Flexibility

During Lesson 5, the class worked together to create a composite list of the elements of music and their definitions. Each of the treasure hunt colour-based teams had been assigned a different selection of five of the 14 elements, so this was an opportunity for each student to gain insight into every element. In order to achieve this, I used a variation of Aronson and Patnoe's Jigsaw Method (1997). This co-operative learning technique, which is illustrated in the poster I designed and displayed in my classroom seen in Figure 3.11, allows students to 'specialise' in a particular area, taking responsibility for a portion of the collective knowledge we wanted to build. Once the students had consolidated their understanding in their original colour-based teams I rearranged them into new number-based groups, where they could share their area of 'specialisation' and learn from the other 'specialists' in their group. Kevin, from the Orange Team, was thus able to share his knowledge about timbre, meter, pitch, structure, and dynamics, for example, and learn from Sameer (from the Green Team) about rhythm, tonality, melody, texture, and articulation.

Once students had learnt about all the elements, they returned to their original colour-based treasure hunt teams to create a mind map that contained all of the information they had gathered.
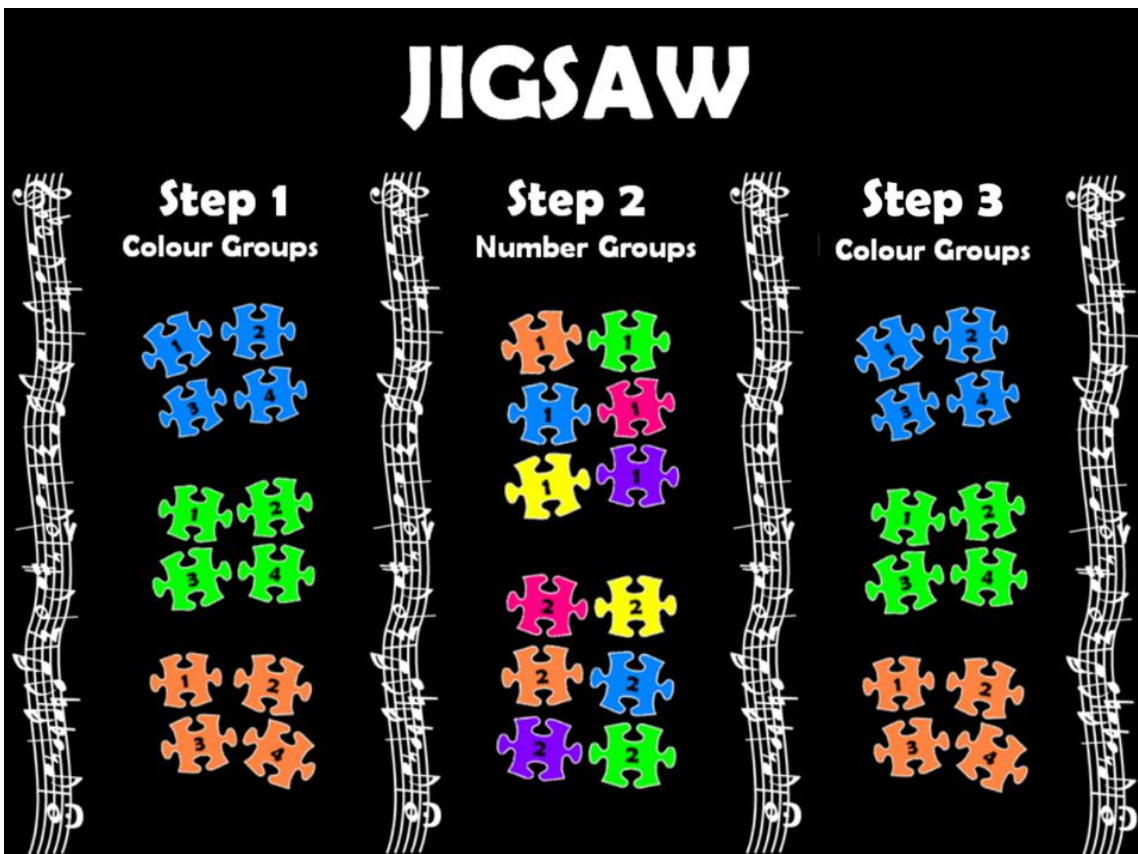
Figure 3.11: Jigsaw Method. Based on Aronson and Patnoe (1997)

During Lesson 4, Ben, Mike and Jack, who were close friends, had swapped their pieces of coloured paper with other students so that they could be in the same Purple Team. They had spent most of the lesson distracted and managed to provide just one, incomplete definition (Figure 3.12).

Figure 3.12: Musical Elements Treasure Hunt Worksheet completed by the Purple Team.

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When confronted by the prospect of sharing their knowledge with their classmates in Lesson 5, these three students reacted in different ways. Ben, suddenly concerned that he would be unable to provide the specialist information needed, set about researching each of the elements on his device, demonstrating a sudden surge in initiative, responsibility, and research and inquiry competencies. Jack was less concerned by his own lack of knowledge, but still asked Ben to explain the definition of each element once he had found it. Mike was even less concerned and made no attempt to remedy his lack of content knowledge before joining his number-based group. Despite the Purple Team's lack of performance in Lesson 4, they were able to generate a relatively complete and accurate elements of music mind map in Lesson 5 (Figure 3.13).

Figure 3.13: Elements of Music Mind Map Worksheet – Purple Group.

Each of the three students had garnered enough information from their peers in their number-based groups to be able to return to their colour-coded team and contribute to a fuller understanding of each element of music. The responsibly of being accountable for a specific portion of information within a group encouraged some students to use their 'step 1 time' (see Figure 3.11) to reformulate and improve the definitions they had developed in Lesson 4. Lesedi and Mia were both observed busily researching their group's elements, despite having insisted previously that their prior musical experience meant that they

already knew them. Nandi, who had been absent in Lesson 4, quickly caught up on the work that she had missed so that she could make a valuable contribution to her group.

Lesson 5: Findings

Collectively, students were more at ease with the non-traditional approach to teaching and learning than they had been in Lesson 4. This may have been due to the fact that they were confined to the classroom and not expected to move around the whole music department. They adapted to new ways of generating and sharing information with different groups of students relatively quickly. Their ability to execute competencies, particularly self-regulation, still presented as 'emerging' in most cases, however. The non-traditional and collaborative approach seemed to contribute a level of excitement in the class, but this then had a detrimental effect on students' ability to regulate their behaviour. They showed a slight improvement in their ability to view the various elements of music as concepts, rather than concrete examples, a conceptual understanding more easily observable in straight-forward musical elements such as dynamics and tempo rather than in less tangible elements such as tonality and timbre.

Students were required to act as both teacher and student in their various groups, and reacted differently to these roles. Some relished the opportunity to take 'centre stage' and explain the meaning of the elements they were responsible for, while others were intimidated by this task. The conviction with which students presented their information was, in most cases, but not all the time, linked to their level of confidence with the content knowledge they were explaining. In the role of learner, some students seemed sceptical when being presented with information from their peers, exhibiting a lack of trust in the credibility of the information. Other students found explanations from their peers extremely useful. When reflecting on this task (as well as the peer-tutoring exercise that will be discussed in Lesson 7) in the term 1 focus group, Pelo commented as follows:

> I just like… I can understand what they're trying to say to me instead of the teachers… sometimes I don't really understand what they're [the teacher] trying to say… but if I get it like on the same level as everybody else when we're all the same age then that helps (Focus Group, 28 March 2019).

Whether students viewed the information they were receiving as credible or not, the act of discussing and clarifying meaning within the groups seemed to aid in the content knowledge development of the students in both 'teacher' and 'learner' roles. In addition,

the pressure of being accountable for their peers' learning pushed them to improve their own understanding, so that they could present their peers with better information.

Lesson 6: Elements of Music Listen and Compare Exercise (11 February 2019)

Research Goals
• Are students able to apply the content knowledge they established in the two preceding lessons? • To what extent are students able to express and defend their opinions within a pair and a small group? • Can students control their own behaviour in order to complete a task in an allotted time?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Interpretation	Communication	Productivity Self-Regulation		

Now that students were becoming familiar with the elements of music, I asked them to apply their knowledge by listening to a piece of music and circling words or phrases they felt described what they were listening to. In line with my aims to expose students to various types of music from around the country, continent, and world (see Chapter 1), I selected six contrasting tracks that included jazz, contemporary art music, a capella Arabic folk music, South African choral music, an American musical theatre ballad, and European electronic dance music. My intention was not only to begin an exposure to a larger range of music than they might previously had known, but also to show them how the concepts and vocabulary about musical elements that they were learning could be applied (or not) to any music. I used an adaptation of Lyman's (1981) 'Think-Pair-Share' methodology to create the three steps of this exercise.

In step 1 (see Figure 3.14), students were assigned a track and asked to circle the words they felt described the elements of music. Once Step 1 was complete, they paired up with another student who had been assigned the same track (as indicated on their worksheet) and the pair had to compare notes and reach a consensus on which words best described their track (Step 2 in Figures 3.15 to 3.18). Having done this, they joined a pair, who had listened to a different track, and they discussed similarities and differences between the two tracks before noting them on the worksheet (Step 3 in Figures 3.15 to 3.18).

Figure 3.14: Listen and Compare Worksheet (front)

This exercise was completed with varying degrees of success. Diale, for example, identified the similarities and differences between the two tracks and recognised which music elements he was comparing. Jack, on the other hand, was able to hear similarities and differences but was less successful in associating the descriptive words with the elements they described, as the Figures 3.15 and 3.16 show. I had included the word 'diverse' on the list in the sense of the antithesis of 'repetitive' (perhaps I should have used 'varied'), but several students took it to mean 'Non-Western' or 'not mainstream'. Ben noted that both of his tracks were "different from mainstream music" while for Lesedi, diverse meant "how cultural a piece is" (Figures 3.17 and 3.18). This drove home how important exposure to a wide range of music was.

STEP 2
Find a partner who also listened to **TRACK 3** and compare your answers.
Did you both circle the same words to describe your track?
Come to consensus on which words describe your track.

STEP 3
Find a pair that listened to **TRACK 4**
Listen to each other's tracks.
Look at the words that the other pair used to describe their track.
Use the table below to compare **TRACK 3** and **TRACK 4** by identifying their similarities and differences.
Think off a word to describe the element that the two words describe.

SIMILARITIES

Track 3 is...	Track 4 is...	Both of these words describe the tracks'...
Moderately Fast	Moderately Fast	Speed or Tempo
Fast	Fast	Tempo
lively	Lively	Character
getting low	getting low	Tempo
loud	loud	dynamics

DIFFERENCES

Track 3 is...	Track 4 is...	Both of these words describe the tracks'...
Vocal	Instrumental	Instrumentation
regular beat	irregular beat	Rhythm
louder at end	soft at end	dynamics
smaller range	large jump in variation	melody
Harmonius	gruff	harmony

Figure 3.15: Diale Listen and Compare Worksheet

STEP 2
Find a partner who also listened to **TRACK 5** and compare your answers.
Did you both circle the same words to describe your track?
Come to consensus on which words describe your track.

STEP 3
Find a pair that listened to **TRACK 6**
Listen to each other's tracks.
Look at the words that the other pair used to describe their track.
Use the table below to compare **TRACK 5** and **TRACK 6** by identifying their similarities and differences.
Think off a word to describe the element that the two words describe.

SIMILARITIES

Track 5 is...	Track 6 is...	Both of these words describe the tracks'...
Low	Low	Pitch
instrumental	instrumental	use of instruments
expressive	expressive	both expressiveness
soulful	soulful	both touching
different length notes	different length notes	different notes

DIFFERENCES

Track 5 is...	Track 6 is...	Both of these words describe the tracks'...
Gruff	Mellow	Quality of the Sound or Timbre

Figure 3.16: Jack Listen and Compare Worksheet

STEP 2
Find a partner who also listened to **TRACK 1** and compare your answers.
Did you both circle the same words to describe your track?
Come to consensus on which words describe your track.

STEP 3
Find a pair that listened to **TRACK 2**
Listen to each other's tracks.
Look at the words that the other pair used to describe their track.
Use the table below to compare **TRACK 1** and **TRACK 2** by identifying their similarities and differences.
Think off a word to describe the element that the two words describe.

SIMILARITIES

Track 1 is...	Track 2 is...	Both of these words describe the tracks'...
Moderately Loud	Moderately Loud	Volume or dynamics
diverse	diverse	difference from mainstream music

DIFFERENCES

Track 1 is...	Track 2 is...	Both of these words describe the tracks'...
Fast	Slow	Speed or tempo
Instrumental	vocal	sounds used
regular rhythm	irregular rhythm	tempo
same length notes	different length notes	tambre

Figure 3.17: Ben Listen and Compare Worksheet

STEP 2
Find a partner who also listened to **TRACK 3** and compare your answers.
Did you both circle the same words to describe your track?
Come to consensus on which words describe your track.

STEP 3
Find a pair that listened to **TRACK 4**
Listen to each other's tracks.
Look at the words that the other pair used to describe their track.
Use the table below to compare **TRACK 3** and **TRACK 4** by identifying their similarities and differences.
Think off a word to describe the element that the two words describe.

SIMILARITIES

Track 3 is...	Track 4 is...	Both of these words describe the tracks'...
Moderately Fast	Moderately Fast	Speed or Tempo
Expressive	Expressive	The way in which a piece is played
irregular beat	irregular beat	the beat of a piece
lively	lively	Speed or tempo
Diverse	Diverse	how cultural a piece is

DIFFERENCES

Track 3 is...	Track 4 is...	Both of these words describe the tracks'...
Vocal	Instrumental	Instrumentation
Smooth notes long	Short and detached	Articulation
traditional	creative	the way the piece was written
Soulful	experimental	the characteristics

Figure 3.18: Lesedi Listen and Compare Worksheet

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Lesson 6: Findings

The individual competencies I was able to observe in each student were recorded on rubrics and added to the data that formed the competency profile maps I will present at the end of this chapter and in Chapter 7. I also noted the following points:

While many still found this uncomfortable, the students were becoming used to sharing and defending their ideas.

While varying levels of confidence seemed to impact this, I noted less resistance to the idea of discussing and refining ideas together.

While there was a general improvement in conceptual understanding between Lesson 4 and 5, Lesson 6 highlighted that a lack of real understanding persisted in this area and that it was through asking the student to apply their knowledge that their gaps in understanding were illustrated.

While students performed at different levels, I did not see any evidence that the different styles on the assigned tracks had any impact on this. Some genres, such as electronic dance music (Ahrix's Nova) were familiar to the students, but others fell far from their frame of reference, particularly contemporary art music (John Zorn's Cat O'Nine Tails). Successfully completed tasks versus unsuccessfully complete tasks did not, however, seem to correspond to familiar musical genres versus unfamiliar genres.

Lesson 7: Pitch Kahoot (14 February 2019)

Research Goals				
• To what extent are students able to assess what they already know and need to learn? • Are students able to repackage and present information in various ways in order to ensure understanding? • To what extent do the students understand their own (and others') learning process?				
Analytical Skills	**Interpersonal Skills**	**Ability to Execute**	**Information Processing**	**Capacity for Change**
Problem Solving	Communication Empathy	Self-Regulation	Information Literacy	Creativity Flexibility Metacognition Curiosity

Once the students had gained an overview of the 14 elements of music and how recognisable they could be in different kinds of music, I began honing in on each element in more detail. The focus of Lesson 7 was pitch. In addition to generating a deeper and more fully formed understanding of the concept of pitch, I wanted students to learn how to name the notes on the treble and bass clef staves. I was cognisant of Stolp's reminder that "Western music theory based on the so-called 'common practice' period… has little or no bearing on composition, performance and music-making practices carried out by most South Africans today" (2015), but I needed the students to be able to read music notation, so that they could perform as an ensemble on their assigned instruments. Western classical theory was also a central component of the music curriculum at FET level (Further Education and Training – Grades 10-12) and students were required to have an indepth underdstanding of this if they hoped to continue with music as a subject during this phase of their schooling and write the Department of Basic Education or Independent Examination Board examinations. I ensured that students were aware that the system we were learning (staff notation) was one of exclusion, capable of representing faithfully only certain types of music from certain parts of the world. We spoke about just intonation and equal temperament tuning systems and listened to examples of music played using each of these systems. I referred back to the tracks we had explored in Lesson 6 and students were now able to identify the Arabic folk music as an example of music that could not be accurately represented by staff notation.

Only 10 of the 23 students were already familiar with pitch in staff notation (from music theory tuition prior to Grade 7) so I taught a traditional, as some refer to it, 'chalk-and-talk' lesson on the subject. After explaining the difference between the clefs, teaching the rhymes used to remember the note names (for example, Every Green Bus Drives Fast for the treble clef lines), and fielding questions, all students indicated that they were satisfied that they knew how to identify these notes and we could move on. In order to ensure that they had a sufficient understanding of this theoretical musical knowledge, I played a game of Kahoot.

Kahoot is a web-based application that allows teachers to gamify their assessments – essentially turning what would be a rather dull task into a game show. A multiple-choice quiz is projected (Figure 3.19), and students use their devices to select a coloured square that represents the correct answer. The quicker a correct answer is submitted, the more points are awarded and students can see their ranking after each question (Figure 3.21). At the end of each game, the top three students are placed on a virtual podium (Figure

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3.22): the "bragging-rights" that accompany this honour are incredibly important when you are 12 or 13 years old. Once a Kahoot is complete, the teacher has access to detailed statistics about each students' performance as well as the class's performance on each question. This information allows the teacher to quickly identify students who do not understand the content, or content areas that are unclear to the whole class. The images below contain some candid shots of the game as we played it.

Figure 3.19: A note as well as 4 potential note names are projected. Students must select the colour that corresponds to the correct answer on their iPad or phone.

Figure 3.20: After a question is answered, the game shows how many students got the answer right or wrong.

Figure 3.21: A leader board is displayed between questions. This heightens the level of competition between students.
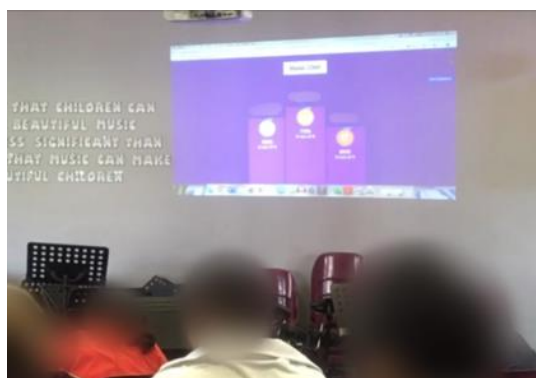
Figure 3.22: At the end of the game, the top three students' names are displayed on a podium.

The results I received, after the initial game of Kahoot, showed that students who had prior knowledge of music theory had attained near perfect results with just one or two slips, whereas the students who had only just learnt note names made several errors, or could not answer questions in the allotted time. This was to be expected, given the varied prior musical experience of the class. Inspired by the constructivist notion that knowledge is generated through collaboration and social interaction, I then asked the students on the leader board (who had received the best results) to identify themselves and help students who required further assistance, explaining that we would play another Kahoot, but that this time I would calculate the results of the game as an average of the combined 'teacher'

and 'student' scores; and that I would also allocate bonus marks for the biggest improvements in 'student' scores. This was supposed to motivate everyone to work together to ensure that all the 'students' were confident with the material.

Students quickly organised themselves into groups of their choosing and began discussing what the 'student' in the group already knew and what they still needed to learn. The images below (Figure 3.23 to 3.26) show some of the methods students used to tutor each other. Kevin helped Dinka find images of the notes and their names on his phone (Figure 3.23), while Trinesh found a YouTube tutorial that explained note names to Paul and Tim (Figure 3.24). Priya explained where each note sits on the stave on the white board before drawing up practice exercises for Vuyo and Diale (Figure 3.26). Ben, in one of the most creative and theatrical explanations, turned his body into a note and rolled around on the floor, carefully positioning himself on the five lines of the stave that had been marked on the floor with tape (Figure 3.25). In Figure 3.25, Ben is showing Jack and Emma where the note 'D' sits. He shouted "Help me! I'm falling to my doom!" before explaining that 'D' is the note that hangs below the stave. "Doom starts with 'D', so you can remember it like that", he added. Given the spectacle that this display caused, the whole class stopped and watched Ben's explanation. From that point on, every note 'D' that was encountered in our practical work became known as the note of doom.

After students had had the opportunity to tutor one another, they played a second game of Kahoot. Almost every student, even those who had acted as 'teachers' rather than 'students', showed an improvement in their final result. There was also a great display of camaraderie between the students. Nthabi had tutored Josh, for example, and despite the fact that these two students were part of very different social circles and rarely had anything to do with one another, they high-fived one another each time Josh answered a question correctly, and embraced each other wildly when Josh's name appeared on the leader board at the end of the game.

Figure 3.23: Students finding images of note online.

Figure 3.24: Students sourcing additional information through online tutorials.

Figure 3.25: Students demonstrating where notes sit on the lines on the floor.

Figure 3.26: Students explaining to one another one the white board.

Lesson 7: Findings

Individually, students demonstrated various competencies through this task. I noted these observations on the rubric I designed for this lesson, and this data as well as the students' self-assessments contributed to the forthcoming competency profile maps. I noted that most students relied heavily on more traditional forms of teaching and learning, clearly drawing on what they had experienced as learners themselves. Several students used technology in teaching their classmates, but while some used content they found online as a teaching aid, others disengaged from the process of teaching and acted, instead, as curators, finding video content for their classmates to watch. There was only one instance of a truly creative and innovative approach to teaching (see Figure 3.25 above).

The results attained in the second Kahoot demonstrated student learners' improved understanding, but student teachers clearly also gained something in this exercise. Reflecting on this task in the Term 1 Focus Group, Ben and Nthabi commented:

Well, I found it quite good to say something you… you don't know a great deal about. You can teach the things you do know about it to other people, but then it gives you a stronger understanding of what you're doing (Ben, Focus Group, 28 March 2018).

I think that helped with, you know, like kind of thinking on your feet and having to change things quite fast because, you know, you've got a problem and it's like, oh, I just realised something where something may not work (Nthabi, Focus Group, 28 March 2019).

The flexibility Nthabi mentioned was seen in each teaching situation, but at differing levels. In most cases, student teachers seemed to be able to gauge whether their methods were working or not, and adapted as needed.

Lesson 8: Rhythm, Meter and Tempo Clapping Games (20 February 2019)

Research Goals				
- Are the students able to persevere through increasingly challenging iterations of a task and perform under pressure? - To what extent are students able to regulate their behaviour and focus enough to participate in this task? - Are students able to interpret audio and visual cues delivered in rapid succession? - To what extent are students able to reflect on, and understand, what they were doing wrong and adapt their methods to successfully participate in the game?				
Analytical Skills	**Interpersonal Skills**	**Ability to Execute**	**Information Processing**	**Capacity for Change**
Interpretation	Self-Presentation	Perseverance Self-Regulation	Information Literacy	Metacognition

In order to learn about the elements of rhythm, meter and tempo, the class embarked on a practical exploration of these concepts. The students and I sat in a circle on the floor. I asked each student to feel their pulse or heartbeat before discussing the properties of a pulse. After some deliberation, we agreed that a pulse was a steady beat. After this, the students played a few rounds of the game popularly known as 'lappy-lappy' whereby students chase and steal one another's spots in the circle. This was done to provide students with a short burst of physically strenuous activity. Once again, I asked students to feel their pulse and note any differences they experienced. Most of the ones who had had a turn to participate in the game noted that their heart was beating faster. After some prompting, the students recognised that the tempo of their pulse had increased. I explained that tempo was measured in the number of beats per second and was about to mention the metronome before Ben interjected and showed the class and I how his smart watch measured the tempo of his heart. A number of students were wearing smart

watches and had probably looked at their heart rate monitors several times before, but were suddenly enthralled with the idea of finding out and comparing the tempo of their hearts.

After much excitement and sharing of smart watches so that everyone could see the tempo of their hearts, I set a metronome to 100bpm and asked the students to count the number of beats. This was done with relative ease at first. I then stopped the metronome and asked students to repeat the exercise, but now, instead of starting from number one, to skip ahead in our imaginary piece of music and start at the random number of 1462. This attempt at counting the beat was obviously very messy and resulted in much laughter as students struggled to fit the multisyllabic words into the quick beats. I explained that we needed to divide our pulse into different sections, so that we could keep track of our music in bite sized chucks called bars. I also explained that we always emphasised the first beat of the bar, which gave music different types of feel. Again, I reminded them that this practice was part of the western classical system and may turn out not to be applicable to other musics.

In order to explore meter, and in preparation of the rhythm games to follow, the students and I played a game where we clapped a common time pulse, emphasising the first beat by slapping our knees:

	1	2	3	4	1	2	3	4
Clapping:	KNEES	hands	hands	hands	KNEES	hands	hands	hands

Table 3.5: Clapping Pulse.

Students were then introduced to a game where they would say their own name, and then pass the turn on to another student by saying their name. This required careful listening and concentration as the pulse needed to be maintained throughout the game; and the game only ended once every student had had a turn.

	1	2	3	4	1	2	3	4
Clapping:	KNEES	hands	hands	hands	KNEES	hands	hands	hands
Ben:	Ben	Ben	Emma	Emma				
Emma:					Emma	Emma	John	John

Table 3.6: Clapping Pulse and Passing Turns from Player to Player.

There were multiple hiccups in the pulse, but the students eventually mastered the game and played a successful round in four-four time. The process was repeated in three-four time (Table 3.7) and two-four time (Table 3.8) with less success due to the rapid response required by these time signatures.

	1	2	3	1	2	3	1	2
Clapping:	KNEES	hands	hands	KNEES	hands	hands	KNEES	hands
Matt:	Matt	Emma	Emma					
Emma:				Emma	John	John		
John							John	Mike

Table 3.7: Clapping Game in Three-four Time.

	1	2	1	2	1	2	1	2
Clapping:	KNEES	hands	KNEES	hands	KNEES	hands	KNEES	hands
Ben:	Ben	Emma						
Emma:			Emma	John				
John:					John	Mike		
Mike:							Mike	Mia

Table 3.8: Clapping Game in Two-four Time.

Once the students had got the hang of the game, I introduced them to the crotchet, quaver (beamed in groups of two) and minim symbols and asked the whole class to clap various bar-long configurations of these notes while I kept the pulse. I returned to the heart rate analogy I had used at the beginning of the lesson and told students about a condition called arrhythmia where someone suffers from an irregular heartbeat. From the word arrhythmia, we found the word rhythm and remembered that we had defined this element as the arrangement of different lengths of sound and silence in time, in our previous lessons. By dividing the class into one group (which clapped the pulse) and another (which clapped the rhythm notated on a series of flash cards I held up), the students were able to gain a practical understanding of how time was measured in music (through the pulse) and how the rhythm corresponded to this pulse.

For the final clapping game, each student was given a flash card that contained a different 4 beat rhythm consisting of quavers, crotchets and minims. The students displayed the cards, so that both they and their classmates could read the rhythm and then each had the opportunity to clap their rhythm, while I maintained a steady pulse with a pair of claves. Once everyone was familiar with their rhythm, we played a variation of the 'name-pass game' where students now clapped their own rhythm before passing the turn on to a fellow classmate by clapping their rhythm.

Lesson 8: Findings

The students with prior musical experience obviously had the upper hand in the rhythm-passing game, as they were practiced at playing a rhythm in time. The first few attempts at this game were stilted, as several students struggled to clap their own and others' rhythms. Lesedi was quick to step in when Ethan made an error in his rhythm, thus halting the game. She took his flash card and pointed to each of the notes in time while counting the pulse out loud. Similarly, when Trinesh noticed that Kylesh was looking at and attempting to clap his rhythm, he pointed to each of the notes in time as Kylesh clapped. This intervention allowed Kylesh to complete his first successful turn in the game. These were not the only instance of students assisting one another that I observed. There was a great deal of excitement in the class and the end of each round was punctuated by fits of laughter and raucous conversation, but I also noted an improved level of self-regulation. The students, particularly those in whom self-regulation had been difficult, like Jack, Paul and Mike, focussed on the game far better than I had expected.

Despite the challenges that this task presented, students generally did persevere, and demonstrated at least basic metacognitive skills in assessing and improving their own performances. It was interesting to note that the notion of peer assistance from Lesson 7 had bled through into Lesson 8, with students readily helping one another despite the competitive nature of the game. In the early stages of the game I thought that it might be too difficult, but the challenging nature of the game, and the necessity for diligent focus, forced students to regulate their behaviour at a higher level than I had observed before. This improvement in self-regulation allowed me to more readily observe the other competencies they were displaying.

Lesson 9: Instrument Karate Check-In (28 February 2019)

Research Goals
• Is the student able to present themself in a confident and professional manner?
• To what extent has the student engaged with and applied the information presented in the flipped classroom material?
• Did the student show evidence of having worked through challenging aspects of the task?
• Could any indications that the student had considered and corrected their process be seen?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance	Information Literacy	Metacognition

Alongside our investigation of the elements of music in class, students had been learning to play their instruments at home, aided by the flipped classroom model. Those who received their instruments on the 28th of January were given one month to complete the task associated with the White Belt (see Instrument Karate and the Flipped Classroom on page 58). I issued regular reminders that this needed to be done by the 28th of February, but when this date arrived, some students had still not submitted their work, due to technical issues. These included school email account password expiries and the rejection of certain video formats. I thus used Lesson 9 to troubleshoot these problems and assist students who were experiencing difficulties.

The Instrument Karate system worked differently for students who were learning an instrument through the class and those who were learning an instrument with an individual private teacher. The eight students who had elected to continue with their private teachers were provided with a worksheet and a framework that explained the general karate system. For their white belt task, these students were asked to complete this worksheet, in conjunction with their private teachers, setting up goals for each of the belts. Figure 3.27 shows the goals that Lesedi set up in conjunction with her teacher. Lesedi was planning to play her Grade 7 piano exam at the end of the year, so broke up the components of the exam and assigned each one to a different coloured belt.

This system allowed the more advanced music students to forge ahead while their classmates were in the early stages of learning to play their instruments. Setting goals and measuring progress, based on standards that were appropriate and specifically designed for each individual student, also meant the students were not unfairly disadvantaged through a lack of prior exposure to music education.

The 15 students who were learning to play an instrument through the flipped classroom were provided with repertoire that they needed to master for each belt. The progression of this work can be seen on page 58. For the White Belt, students were asked to watch a video in which I provided a little background information on their instrument, showing how to assemble it, how to hold it, how to produce a sound on the instrument, how to clean it, disassemble it and correctly pack and store it in its case. There are many video tutorials containing this information online and I did encourage students to look for, and make use of, additional online resources, but I felt it best to create my own set of videos that provided the same instructions and information across all instruments. I had also learnt, as a teacher, that students often struggle to curate quality resources, often selecting

whichever resources is found at the top of their search engine list. This was a skill that I planned to develop through the course, but I wanted the students to have access to high quality instruction right from the initial stages of their exploration of their instruments. I also felt that the consistency of seeing me both in class and online would be beneficial to them and would help with the development of our student-teacher relationship.

WHITE	The white belt symbolizes a birth or beginning of a person's will to acquire skills, and it is worn by those who are just beginning the pursuit of their goals.	Complete this form, in conjunction with your practical teacher, by setting a series of goals for yourself to complete during 2019. This could be a Trinity or ABRSM exam you would like to complete or a Concerto you may want to perform. The ultimate goal should be written in the 'black belt' block and the steps you will need to take in order to achieve your black belt should be assigned to the other belts.
YELLOW	Yellow signifies the first beams of sunlight that give a seedling new growth and new life. As such, the yellow belt is worn by a beginner who has just embarked on the process of working towards their goals.	I would like to finish my first exam piece (gigue by Bach)and my major scales
ORANGE	Orange represents the growing strength of the sun, so the orange belt is given to a beginner once he or she has begun to progress towards their goals.	I would like to memorise my first exam piece and learn my major arpeggios.
GREEN	Green is a representation of growth, so it is given to intermediate students who are learning to strengthen and refine their skills.	I would like to learn my second exam piece (Lied ohne Worte by Mendelssohn) and my minor scales.
BLUE	Blue represents the sky and the light it provides all growing things, so the blue belt is given to students at the stage of their studies when they begin to learn additional knowledge that allows their musicianship to continue to grow and develop.	I would like to memorise my second exam piece as well as starting to do three sight reading exercises daily
PURPLE	Purple represents the colours of dawn, so a purple belt is given to a student who is transitioning into the advanced stages of study.	I would like to learn my third exam piece (Rosemaries waltz) i would like to learn all of my chromatic motion scales.
BROWN	Brown is a representation of the ripening of a seed during the harvesting process, so a brown belt is awarded to advanced students who are beginning to realize the fruits of their studies and whose techniques have begun to mature.	I would like to memorise my third exam piece as well as consolidate all of my scales and arpeggios and be confident with my pieces and scales.
RED	Red symbolizes the red hot strength of the Sun. In the same way that a growing plant must stretch its way slowly toward the Sun, students with red belts stretch their skills by joining an ensemble.	I would like to play all of my exa pieces at the Joburg festival and achieve a diploma in them as practice for my exam.
BLACK	Black symbolizes the darkness beyond the sun, and a person who has been awarded a black belt seeks to gain a deeper and further understanding of music performance.	I would like to pass my grade 7 ABRSM exam with distinction

Figure 3.27: Lesedi White Belt Submission: Instrument Karate Goals

In order to complete their white belt, students were required to record and submit a video of themselves assembling, producing a sound on, cleaning, disassembling, and packing away their instrument. In addition to creating videos, students were asked to reflect on their experiences of making the videos. This reflection took the form of a self-assessment and touched on each of the main competency areas.

Lesson 9: Findings

The observations from which my findings come are from the videos submitted in Lesson 9 rather than the lesson itself, which simply consisted of technological trouble shooting. Asking students to create video assignments at home gave me an unprecedented glimpse into their lives. Some students got the whole family involved – mom held the music book, dad held the camera and a younger sibling looked on in delight. The ability to perform in front of an audience, even one's own family, showed a level of confidence that became even more apparent when the students eventually started performing as an ensemble in class. Other students created their videos in their personal spaces, which illustrated the vastly different maturity levels of students in the same class. Ethan, for example, presented his trombone video while seated next to the toybox in his playroom, while Nthabi presented her saxophone video from her bedroom which was plastered with posters of various actors and singers. I was struck by the differences I observed and was reminded that, although the students in this class were the same age, they were on the cusp of adolescence and while some were still very much children, others had started maturing into teenagers. Wherever the video was being shot, it was interesting to see the levels of confidence and ways students presented themselves. While some students simply played their pieces with little or no acknowledgement of the camera (or the audience who would eventually watch their presentation), like Ethan in the example above, others eagerly engaged with their potential audience. Ben, for example, greeted me, saying "hello, future Miss Mullins", and was so impressed with his presentation that he ended his video with a boisterous "ta-da".

Once the technical issues had been resolved and every student had submitted their White Belt task, I was able to observe that every student, save Tim, had completed the task successfully. Tim had inverted his hand positions on the clarinet, incorrectly placing his right hand above his left. Tim had managed every other aspect of the task correctly, but I did ask him to refilm his video, after pointing out the hand position error.

The students who were learning to play a new instrument had clearly engaged with the material provided on the flipped classroom and followed what were, in some cases, complex, multi-step instrument assembly processes, with minor errors and few references to their notes. The fumbling and self-correction of hand and mouth positions illustrated to me that the students had spent time struggling with their instruments, but had considered their errors, corrected their actions and found a way to successfully complete the task. I saw this as evidence of reflection and metacognition. This engagement was also seen in the challenge of producing sound on a new instrument. Every student was able to do this in the video they submitted, but not always on their first attempt. The 'false-starts' and unexpected squeaks that were followed by slight and considered adjustments resulted in relatively successful sounds. This showed me that students had taken the time to work out how to make a sound on their instruments and were applying their tried and tested methods to achieve this. Students reacted to being on camera in different ways. Some were extremely self-conscious and assembled their instruments in silence, while others confidently explained their process.

Cycle 1 Competency Profiles

As I was discussing the Treasure Hunt task at the beginning of this chapter (page 60), I presented an example of the rubric system I used to record my observations of competency development (Table 3.4). I produced one of these tables for Lessons 4 to 9 of the first research cycle, and in total was able to assess 18 different competencies from all five of the broad competency groups. Figure 3.28 show which ones were assessed and how many times they were assessed during the course of the cycle.
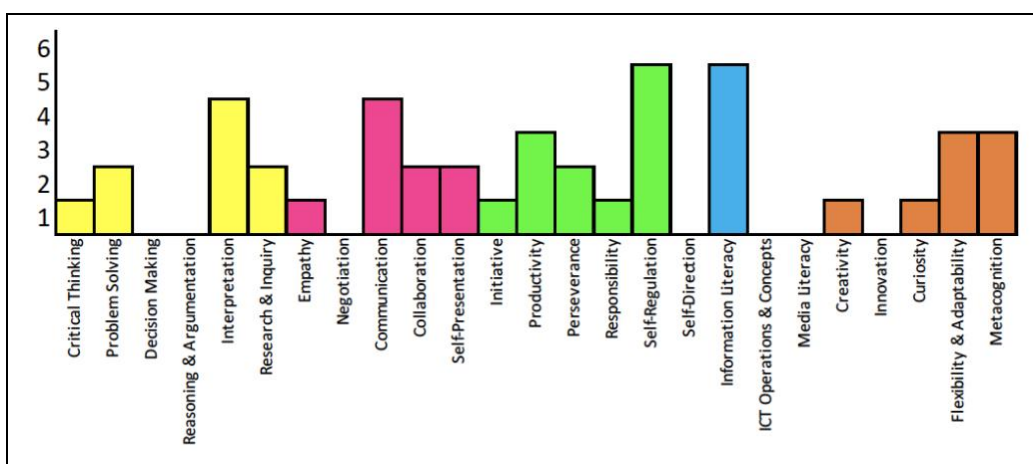
Figure 3.28: Competencies Assessed During Research Cycle 1.

In each case, I identified the competencies I observed as 'emerging', 'developing', 'proficient' or 'exemplary' and assigned numerical values to them as follows:

Emerging   = 1 point
Developing   = 2 points
Proficient   = 3 points
Exemplary   = 4 points

The point score for each broad competency area was calculated and converted to a percentage for each student, taking into account absenteeism, so as to produce an accurate representation of the student's abilities. These percentages were then plotted on a radar graph to compile a competency profile map for each student (more detailed information on the construction of these competency profile maps in provided on page 198). These profiles allow each student's specific abilities in the five broad competency areas to be compared and monitored throughout the four cycles of the research project. In each competency profile, the students' analytical skills are plotted on the top axis, interpersonal skills are plotted on the upper right axis, ability to execute is plotted on the lower right axis, information processing skills are plotted on the lower left axis, and capacity for change is plotted on the upper left axis (Figure 3.29).
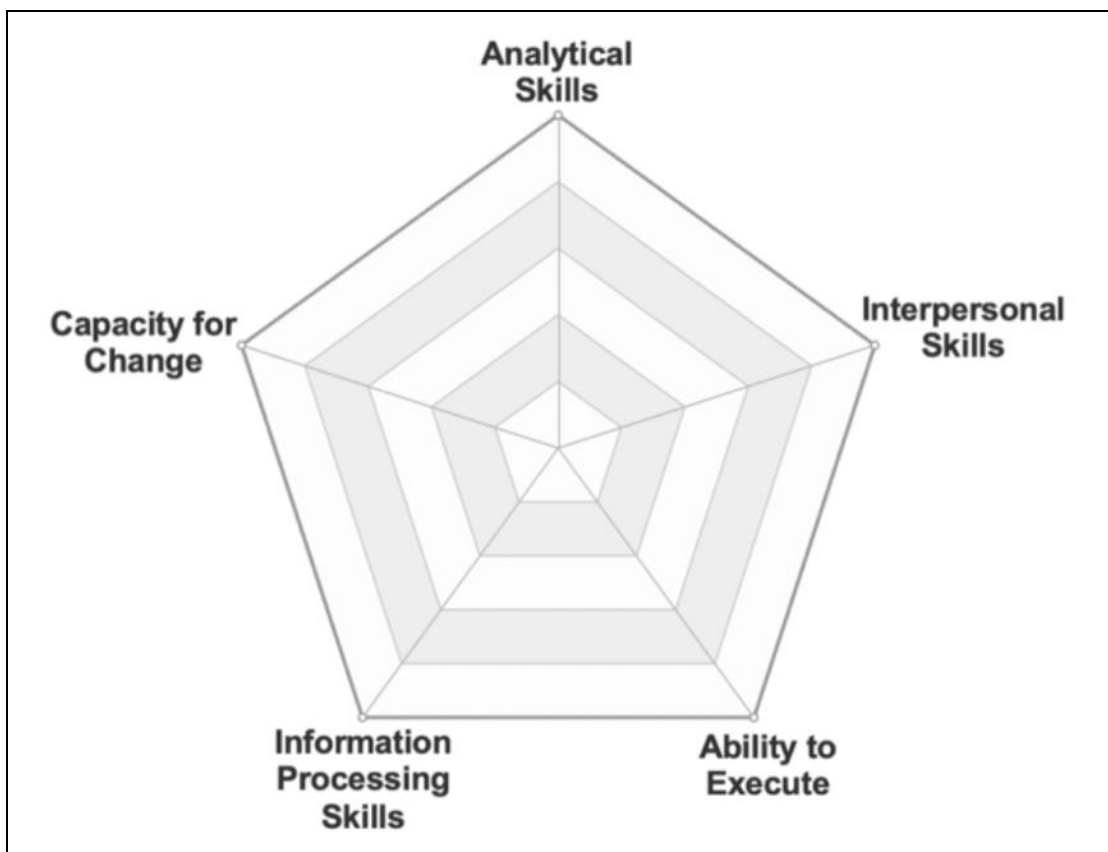
Figure 3.29: Competency Profile Layout.

As you can see from the competency profiles in Figure 3.30, each resultant shape is unique to the student it represents. Some students have smaller profiles than others; some profiles are relatively equilateral while others' show strengths in one particular area. No matter the shape or size of the competency profile, it offered interesting insight into each of my participant's capabilities and provided an important baseline from which to measure the competencies in the ensuing three research cycles.
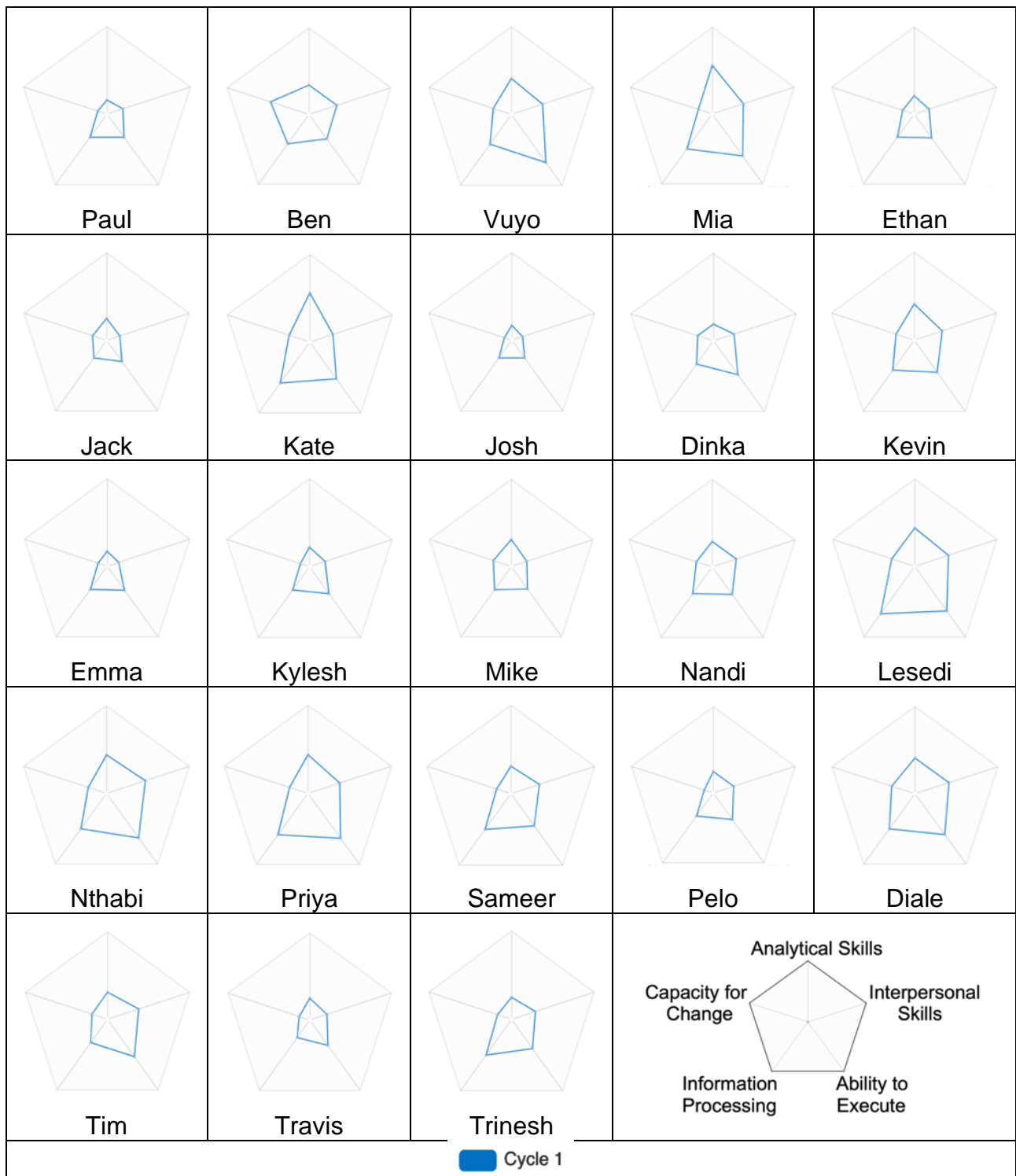
Figure 3.30: Cycle 1 Competency Profiles

Not surprisingly, the more musical experience students had already, the larger their competency profiles, as Figure 3.31's profiles of the 10 students who had passed 'Grade' exams shows. The students who had completed lower grades (Mark, Kylesh and Dinka) presented with less developed competency maps than their more musically experienced peers.
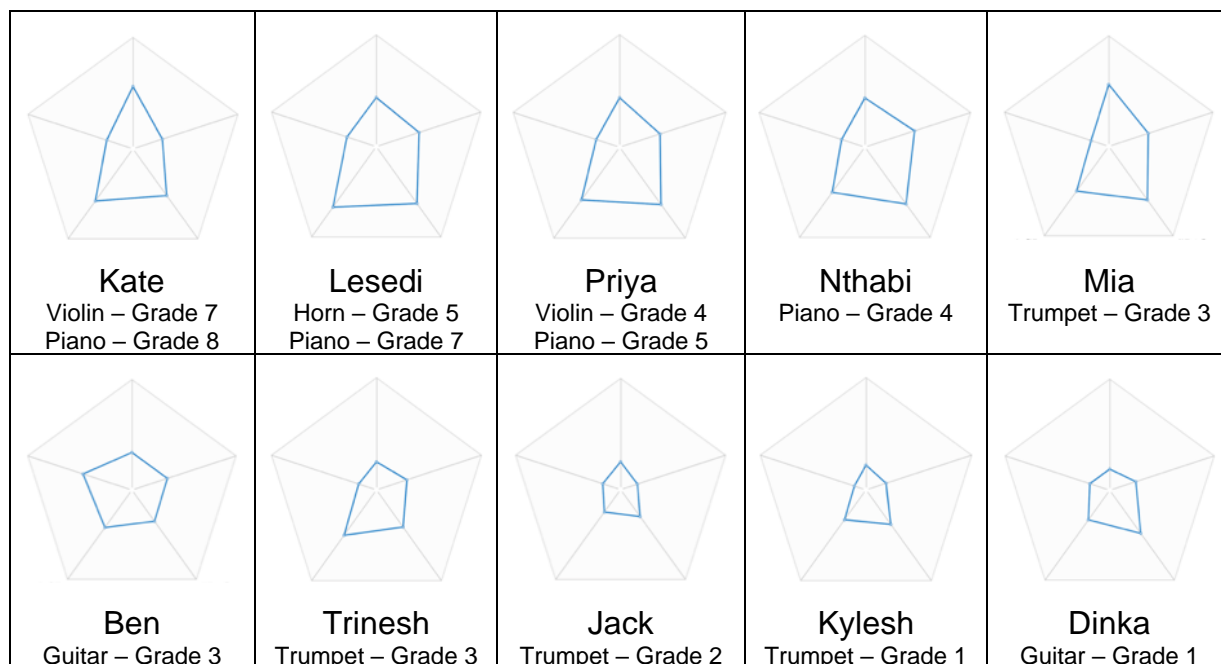
Figure 3.31: Cycle 1 Competency Profiles of Students with Prior Musical Experience.

The other 13 students, however, who were all 'beginners' in music training, did not all compare unfavourably, and the way these profiles developed over the next three cycles is one of the things that I will investigate in greater detail when I analyse the overall findings of this study in Chapter 7.

Research Cycle 1: Conclusion

I had intended to use the first research cycle as an opportunity to observe the baseline competencies each student in my study was able to display. Given that the six lessons that I observed took place over the course of just one month, I did not expect to see much improvement in any of the competency areas. Surprisingly, I was indeed able to see a progression, and some of my observations began pointing towards answers to the research questions that I laid out in Chapter 1.

In Lesson 4, a number of students, particularly those with prior musical experience, had expressed a concern about sharing what they knew and allowing teammates to take credit for information they considered to be their own. In Lesson 5, a slight distrust and sense of resentment was apparent when students were, once again, asked to share information. As students realised that they would act as both 'teacher' and 'student' in this exercise, however, this tension eased and, in some cases students were actually driven to do better work, due to the responsibility of having to provide thorough and accurate information they felt. Students were required to collaborate and share information in pairs and small groups in Lesson 6 and, again, seemed to do this more readily and with greater ease. In Lesson 7, while teaching each other about the notes on the stave, students began to see the benefit of sharing information they possessed, as it affirmed and consolidated this knowledge. Lesson 8 did not rely on any sharing of information, but in a number of cases, students, without any prompting, offered insights and advice to their peers. When considering my first research question: "Which of the 21CC can effectively be developed through music?" I could immediately see promise in the broad interpersonal skills area. I also noted that metacognition, flexibility and perseverance appeared to be being developed too. I made a note to observe this as the study continued.

The progress noted here mostly arose from the gamified lessons, pointing to an early answer to my second research question: "Which pedagogical methods are most effective in developing 21CC?"

An unanticipated setback in this study came in the form of the self-assessments that I was hoping to use as a major source of data in the construction of the competency profiles presented above. As I mentioned when discussing Lesson 5 (page 66), I struggled to collect self-assessments from students throughout the first research cycle. These self-assessments were available online and students were always given an opportunity to complete these at the end of each lesson. Students regularly neglected to complete the self-assessments, usually citing technological issues, even though this was not always the case. Students often simply did not even attempt to log on and complete the task, rather using the time to socialise with friends or engage in other activities. As the results of these assessments were online, I did not have a quick and easy way to check that they had all been submitted before dismissing the class. I remedied this by switching to paper-based self-assessments at the beginning of the second cycle.

The self-assessments that were submitted were collated to form competency profile maps for each student, however, these in no way mirrored the competency maps that my observations had generated. While this discrepancy between student self-assessments and teacher observations would have been an interesting finding to discuss, I was concerned that this was simply an indication of the different amounts of data I had collected for each of the profiles. I did not feel that the competency maps generated from the incomplete and inconsistent data provided by the students would constitute a reliable source.

I had deliberately included a number of online resources and tasks in order to challenge and develop students' ICT skills and concept competency, as well as to capitalise on this age group's preoccupation with technology. I soon learnt, however, that as much as the students spent time on social media, they rarely check their Google Classroom and email accounts. I had used the Google Classroom platform to distribute the self-assessments and send feedback. While, at this point, I was still investigating my third research question "What type of feedback do the students and I find most effective?" I realised that my online method of delivery did not work as effectively as hoped, and I would need to revise this in the second research cycle.

Potential answers to the fourth and fifth research questions: "Does an explicit focus on the development of 21CC assist in or detract from the development of these 21CC?" and "Which 21CC that are developed in the music class do the students feel they can transfer to other learning areas?" were not evident at this point in the study, but I knew that the lessons planned for Cycles 2, 3, and 4 would allow me to investigate these.

Chapter 4 – Research Cycle 2

As Chapter 3 explains, in Cycle 1 I introduced the notion of 21CCs, established a baseline of students' pre-existing 21CCs, allocated instruments, established the routines, expectations and vocabulary that would be used in the classroom, and worked on musical elements. By the end of the cycle, I was able to draw up a tentative competency profile for each student. Cycle 2 followed Cycle 1 almost immediately, but there was a 5 weeks hiatus caused by school holidays and unexpected medical leave between Cycles 2 and 3. Although both Cycles 2 and 3 concern the making of a musical instrument, I separated this activity into two cycles because of this hiatus. This chapter will look at Cycle 2 which covers the design phase of the project, while Cycle 3 in Chapter 5 will deal with the building phase. Table 4.1 shows the dates and content of Cycle 2's lessons.

Lesson 1	6 March 2019	Instrument Classification
Lesson 2	11 March 2019	Project Introduction
Lesson 3	14 March 2019	Design Lesson 1
Lesson 4	20 March 2019	Design Lesson 2
Lesson 5	25 March 2019	Design Presentation 1
Lesson 6	28 March 2019	Design Presentation 2
Lesson 7	3 April 2019	Design Presentation 3

Table 4.1: Research Cycle 2 Lessons

As I explained in Chapter 2 (see page 46), I could not fit all the activities I had planned into the school year because of the major timetable change. Rather than squashing planned activities into less time, I decided to do one large scale project, on instrument building. This activity, in addition to allowing students to explore the elements of instrumentation and timbre, was collaborative in nature, demanded high levels of creativity, innovation, critical thinking, and problem solving, and I could challenge the students much further than I had been able to in Cycle 1. In addition, I could use a 'Project-Based Learning' (PBL) approach, which suited this large project well. Although PBL developed out of John Dewey's "learning by doing" in the early 1900s, in the last two decades it has been used in order to develop 21st-century competencies (Boss 2011, Barron & Darling-Hammond 2008, Bell 2010, Vega 2012). As Bell puts it, "by implementing PBL, we are preparing our students to meet the twenty-first century with preparedness and a repertoire of skills they can use successfully" (2010, 43).

In PBL, students generate a driving question around a topic they are interested in, which forms the basis of an inquiry that draws on various media, as students research their topic and create a project that demonstrates their findings. The project is presented to an audience of classmates, parents and other members of the community for questions and feedback (Larmer and Mergendoller 2012, Vega 2012, Krajcik and Blumenfeld 2006, Bell 2010). PBL can be incorporated into any subject, but lends itself to interdisciplinary work (Boss 2011, Pinto 2019, Hynek 2017, Bell 2010, my.pblworks.org). Tobias et al. point out that although a large number of articles about music projects have been published over the last century, "only a handful of articles that provide historical and/or theoretical frameworks used to design projects that include the defining characteristics of project-based learning" (2015, 40) are available. Campbell suggests that "Doing a project in the music classroom is an effective instructional method that stimulates student learning and energizes teaching and teachers" (1995, 38).

Mackenzie (2016) identifies four graded 'Types of Student Inquiry' that can be used within project-based learning, as the illustration reproduced from his website in Figure 4.1 shows. Dealing with a class of 12-13 year olds, I felt that his second type, 'Controlled Inquiry' – where the teacher selects the topic, questions, resources and product, but gives students options in terms of the paths they take to reach their end point – was the best suited to this class. In other words, students are given a well-defined problem that has open-ended solutions. The goal is clear, but the individual paths available to get there, and the plethora of creative solutions to solve the challenge, are endless.
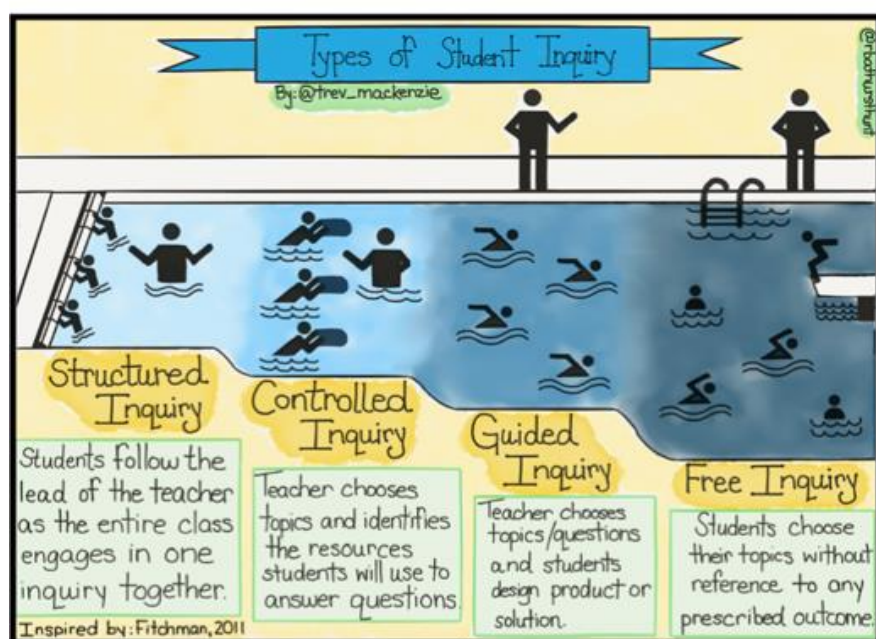
Figure 4.1: Types of Student Inquiry (MacKenzie 2016).

Students used their class time to work on this project, and continued to work on their individual instrumental skills through the flipped classroom, submitting Yellow Belt assignments in April.

Preparation for Research Cycle 2: Developing the Structure and Materials

Before starting Research Cycle 2, I had to establish the structure of the project and prepare a number of resources, bearing in mind that I needed to provide students with a certain amount of content knowledge (knowing the names of orchestral instruments and families and the Hornbostel-Sachs classification system) in order to satisfy the curriculum expectations. I also carefully considered the content delivery systems I designed, cognisant that these methods would affect students' competency development and allow me to measure this growth. Concerned by the State curriculum's Western classical music bias, I decided to expand the original Hornbostel-Sachs' classifications (aerophone, membranophone, idiophone, chordophone), to include non-Western instruments, and the fifth (updated) Hornbostel-Sachs category: electrophones (Lee 2019). The electrophone thus became the instrument students had to design in Cycle 2 and build in Cycle 3, which opened up the possibility to observe a greater number of competencies develop, particularly ICT skills & concepts. I had hoped a website design project would serve as the main vehicle to exercise these competencies, but given my time constraints, this fell away, although I was still able to touch on it as a competency area (as explained in Chapter 7). The electrophone also opened up the number of timbral possibilities available to students, building on the elements they were learning and expanding their notion of what constitutes an 'instrument'. I produced flash cards, video content and worksheets to guide students through the project and will present these throughout the chapter.

Preparation for Research Cycle 2: Dividing Students into Groups

An important aspect of project-based learning, and a crucial tool that underlies the development of many 21CCs, is group work. The first aspect to navigate was how best to form groups. At first, I considered allowing students to choose their own groups, but after getting to know their strengths and weaknesses during the first research cycle, I decided to allocate groups myself, so that I could set up and then observe various situations. The baseline competency profile maps that I had generated from the first research cycle as

well as my knowledge of students' prior musical experience and ability, their academic ability, the social dynamics in the class and the individual personalities of each student, aided me in constructing these groups.

Figure 4.2 shows their configuration, as well as each group member's Cycle 1 competency profile map. Here you will see that each group contains students with profiles of various shapes and sizes. Due to the uneven number of students in the class, one of the groups needed to have one less participant than the others. In order to compensate for this, I placed three students with relatively large competency profiles in this group.
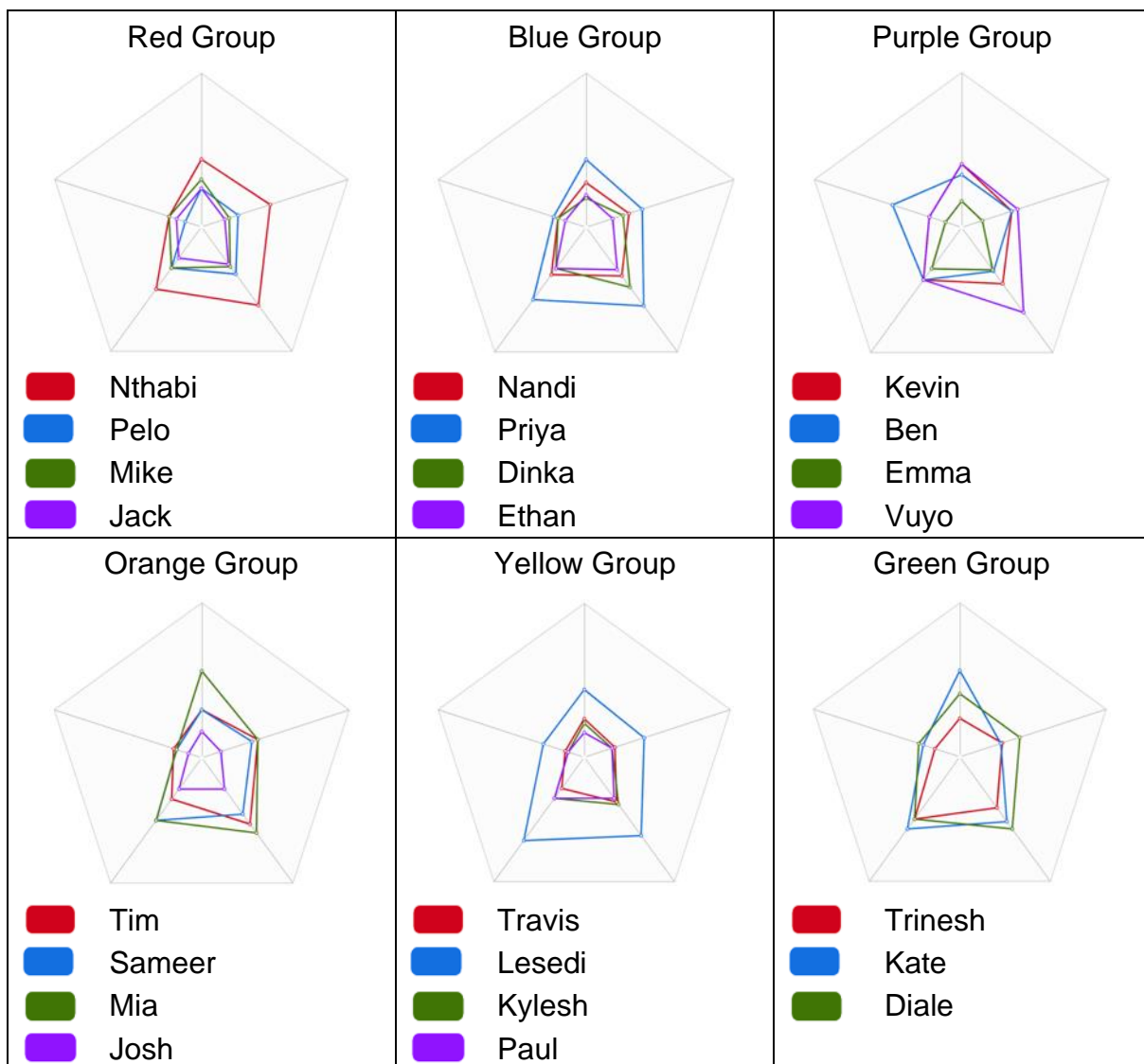
Figure 4.2: Cycle 1 Competency Charts of Instrument Project Group Members

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Presentation of the Data

As in Chapter 3, I will highlight my research goals before describing each lesson, explaining my observations, commenting on assessment, and noting my findings. Because this cycle is more complex than Cycle 1, I give headings to these different components of each lesson. The students' individual competencies were observed and recorded on rubrics and this data will be presented as competency profile maps at the end of this chapter and again when analysing the research findings in Chapter 7.

Lesson 1: Instrument Classifications (6 March 2019)

Research Goals
• Are students able to critically assess usual instruments, categorise them, and justify their explanations?
• Were students able to connect the Makey-Makey, troubleshoot technical problems and persevere through technical difficulties?
• Are students able to work effectively in groups?
• Did the students exhibit signs of curiosity in the way they engaged with the activities?
• Did the students use the given technology in creative and innovative ways?
• To what extent can students control their own behaviour in order to complete a task in an allotted time?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving Decision Making Reasoning & Argumentation Interpretation	Communication Collaboration	Initiative Perseverance Responsibility Self-Regulation	Information Literacy ICT Operations & Concepts	Creativity Innovation Curiosity

Lesson 1: Description

During Lesson 1, students were divided into their project groups and assigned a workstation. Each group was given a stack of flash cards that contained pictures of the instruments of the orchestra, which they were able to identify and separate into orchestral families with relative ease, noting that this was something they had covered in preparatory school. After discussing the classifications of instruments like the saxophone and piano which had stirred up some debate, I asked the students which instruments had been left out.

I wanted to ensure that my students became aware of the notion of 'left out' content, because traditional class music syllabi are biased towards disregarding most musics that

do not fall into the Western Classical Idiom, and while the scope of this project did not allow me to delve too deeply into musics that had for too long been ignored by the curriculum, I was determined to make sure my students were aware of the richness and diversity of various musical styles (through listening examples), and cognisant of the exclusionary nature of much of the music theory we were studying.

They were quick to list a number of instruments they could not find on their flash cards, including the cor anglaise, piccolo, sousaphone, and voice; and, once I prompted them to think outside of the orchestra, the didgeridoo, sitar, kudu horn and vuvuzela. This transitioned into the Hornbostel-Sach classification system, where I noted that it allowed us to classify *any* musical instrument. I explained aerophone, chordophone, membranophone, and idiophone using various instruments in our classroom to demonstrate sound production. Once each student had a firm grasp of this new classification system, I asked them to rearrange their flash cards into these new groups.

After discussing some points of confusion, which mostly occurred around the percussion instruments, I provided each group of students with a worksheet they would use to classify a selection of unusual instruments, footage of which I had curated from the Internet. These instruments included relatively common ones such as the accordion, armonica and musical saw, less common ones like the yaybahar and water harp, and homemade instruments such as 'the wing' (a large sheet of metal with multiple protruding metal rods that can be struck or bowed) and a marimba-type instrument (constructed out of pvc-pipe and struck with large rubber paddles). The students had to discuss each of these instruments in their groups before providing a classification and justification for their answer.

Then I played students clips of the theremin and stylophone, asking them to find a word that would best classify these instruments. The students were quick to arrive at the notion of an 'electrophone' and excited to learn that they would have an opportunity to build their own electrophone. I explained that we would use Makey-Makey[5] hardware and the online software application Scratch[6] to create our instrument. The remainder of this lesson was an opportunity for students to play with this technology. I provided each group of students with a laptop computer, Makey-Makey board and selection of materials including tin foil,

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[5] The Makey-Makey is a small circuit board that allows the user to trigger keys on the keyboard using conductive objects that can be connected to it using crocodile clips (https://makeymakey.com).
[6] Scratch is a block-base visual programming application that helps students think creatively, reason systematically, and work collaboratively (https://scratch.mit.edu/).

paper clips, playdough and leaves. They logged onto the Makey-Makey Piano App[7] and began experimenting.

Lesson 1: Observations

When discussing the idiophone category, I noted some general confusion in the class, so walked from desk to desk with a pair of cymbals, allowing each student to feel the instrument vibrating with sound. Kevin and Ben used the opportunity to sting one another with the elastic bands that had held their flash cards together whereupon Ben shouted, "I've made a chordophone!". Kevin was quick to interject, "It's an idiophone, not a chordophone!", since the whole object was vibrating. This prompted the whole class to begin making sounds with their rubber bands and was followed by a discussion about amplification, and ultimately a deeper understanding of the various instrument categories. A strong sense of curiosity developed, as some students began using objects around the classes to make sounds and then assess the sound production method. Trinesh, for example, began shaking his water bottle before exclaiming that he had invented an 'aquaphone'.

The image below (Figure 4.3) shows the class as they began to experiment with the Makey-Makey. Unfortunately the faces of my participants have to be concealed in order to protect their anonymity, but I was struck, while editing this image, by the joy, wonder and excitement on each little face. Almost every student was engaged and curious as they used various objects – and one another – to trigger new and exciting sounds.

Figure 4.3: Experimenting with the Makey-Makey

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7 https://apps.makeymakey.com/piano/

A number of students encountered technical difficulties when setting up their computers and Makey-Makeys. Some students gave up while others, such as Travis, Tim and Ben persisted and were eventually able to overcome their technical difficulties. I had provided the students with various conductive objects to use as triggers, but encouraged them to find other suitable objects around the class. Most students however only used the materials provided, particularly the playdoh (Figures 4.4 and 4.5).
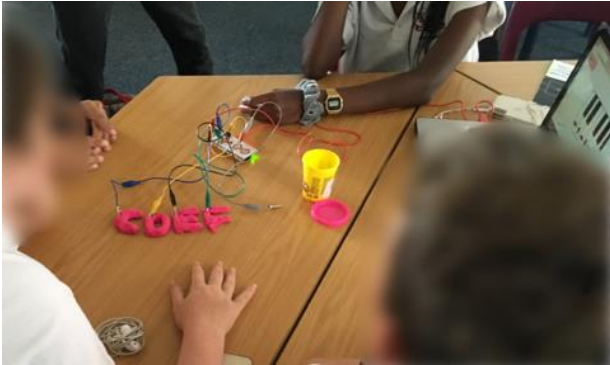
Figure 4.4: Makey-Makey Experimentation – playdoh letters to trigger sounds
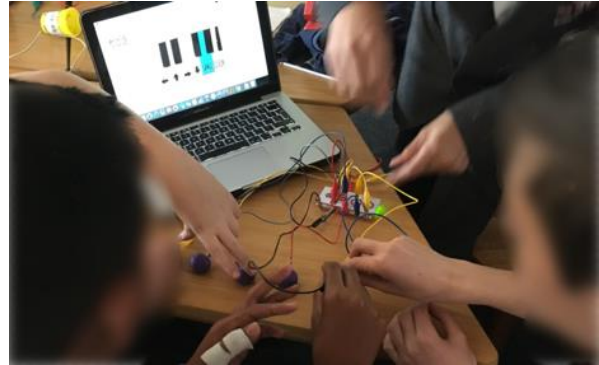
Figure 4.5: Makey-Makey Experimentation – using one another to trigger sounds

Lesson 1: Self-Assessment

Given the trouble I had experienced with electronic self-assessments in the first research cycle, I used paper-based self-assessments, but as 'exit tickets': students were not allowed to leave my class before submitting them. Once I had these pieces of paper, I could review them, add comments, and return them to students in the following lesson. The students kept these self-assessments and referred back to them, and this became a very effective feedback method and reflective and metacognitive tool, explored in greater depth at the end of this chapter.

Lesson 1: Findings

I was struck, in this lesson, by the important role of play. Despite my explanations and demonstrations on the wonderful instruments I had at my disposal in my incredibly well-resourced classroom, it was the students' own resourcefulness – stretching and plucking an elastic band, banging on a desk, and blowing over the top of a water bottle – that allowed them to truly develop an understanding of terminology.

I also noticed high levels of curiosity and critical thinking. I expected these to emerge when I introduced students to the Makey-Makey board, but once again (see pages 63, 82, and 90), I found that their critical thinking and creativity during the play session seemed to dissipate as they became bogged down by technical challenges. Because they all use computers, smartphones, and other devices I expected them to be more technologically savvy. However the technical challenges were, in themselves, important for competency development.

Lesson 2: Project Introduction (11 March 2019)

Research Goals
• To what extent are students able to regulate their behaviour and work productively in a relatively unstructured lesson? • Were the students able to articulate conceptual understandings of the various competencies? • Were students able to connect the Makey-Makey, troubleshoot technical problems and persevere through technical difficulties? • Are students able to work effectively in groups? • Did the students exhibit signs of curiosity in the way they engaged with the activities?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving Decision Making Reasoning & Argumentation Interpretation	Communication Collaboration	Initiative Perseverance Responsibility Self-Regulation	Information Literacy ICT Operations & Concepts	Creativity Innovation Curiosity

Lesson 2: Description

Lesson 2 was dedicated to unpacking the expectations of the project. The students were presented with a worksheet (Figure 4.6) that gave a definition of an electrophone, noted which materials would be available to them, provided information about Scratch and the Makey-Makey, explored the ideas of creativity and innovation, outlined the structure of the project, and listed the competencies it aimed to develop.

Term 1 Music Project:
Produce a Creative and Innovative

Electrophone

What is an electrophone?
An electrophone is a musical instrument that produces sound though the use of electrical current.

What makes something creative and innovative?
For something to be creative, it needs to stem from a new and original idea where ordinary things may be put together in new and exciting ways. This creative idea should then be realized to make an innovative object that can make a tangible and useful contribution.

What materials will be available to me in class?
- Wire
- Paint
- Glue
- Scissors
- Tape
- Tin Foil
- Recycled boxes etc.
- Makey Makey Board
- Crocodile clips
- Mac Laptop
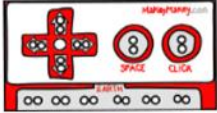
What will I need to do to complete this project?
- Design a creative and innovative electrophone
- Have your design critiqued by your teacher and class
- Revise your design after receiving feedback
- Create a plan of action, which assigns different tasks to different group members
- Construct your instrument out of the available materials
- Program your sounds using Scratch
- Attach the Makey Makey board to your instrument and computer and troubleshoot any problems you may encounter
- Complete regular self-assessments
- Present your Makey Makey to your class mates and a panel of teachers

What is Scratch?
Scratch is a block-based visual programming language. With Scratch, you can program your own sounds. Scratch helps you to think creatively, reason systematically and work collaboratively

What is a MAKEY MAKEY?
A Makey Makey is a circuit board that allows you to turn any object that conducts electricity into a key on a computer.

What skills will I develop by doing this project?
Analytical Skills, Interpersonal Skills, Ability to Execute, Informtion Processing Skills and Capactiy for Change

Figure 4.6: Project Information Sheet

The students were also given a set of questions that aimed to define the competencies measured throughout the project, via the think-pair-share method (Lyman 1981). I asked them to write down their own ideas in each of the blocks (think), then discuss their answers with their group/or partner (pair), then share them on a master list we created on the white board (share). Once they had settled on the descriptors of each of the competencies, they could play and experiment with the Makey-Makey, Scratch, and various recyclable materials that I had collected in preparation for the project.

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Lesson 2: Observations

The students had differing and interesting ways of expressing their understandings of the competencies, as can be seen in the Purple Group's and Blue Group's responses shown in Figures 4.7 and 4.8. The Purple Group identified problem solving as the ability "to constantly tackle problems head on", while the Blue Group added that it was the ability "to think systematically". The Purple Group also noted that "rainbow thinking" was an important aspect of critical thinking. When I asked the group to expand on this idea, they mentioned the thinking hats[8] that were displayed on my wall. The inclusion of the students' voice in the definitions of these competencies led to a much greater understanding of the requirements for the project. I was also able to see cases where students had the wrong idea. The Blue Group, for example, indicated that in order to be a good communicator one should be "loud", "stress your point", and "banish social awkwardness" (Figure 4.8). This gave rise to a class discussion where the class came to the decision that the loudest voice is not always the best voice to listen to.

Figure 4.7: Purple Group's Competency Definitions   Figure 4.8: Blue Group's Competency Definitions

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[8] This was De Bono's theory of the Six Thinking Hats (1985) that taught students to approach an idea from six different points of view

Once this task was complete, the students set about busily collecting various materials and setting up their computers. I observed a distinct decline in the students' self-regulation competencies, as well as a heightened sense of curiosity. There was a preoccupation, around the class, with banging items together to see what sounds they made. The recyclable materials contained several discarded slats from venetian blinds. Shaking these slats produced an interesting sound – and made wonderful weapons in the swords fights that took place with them (to my dismay). I had to remind the students, on several occasions, that the aim of the project was to create an electrophone, not an idiophone, and that self-regulation was one of the competencies they should be working on.

Ben was the first student to begin systematically checking the conductivity of materials, a level of critical thinking and problem solving not observed in many other cases. Nthabi, Jack, Pelo and Mike decided to use one of the foil (conductive) baking pans as the basis of their instrument, a decision that would lead to problems later on when they started attaching various objects to it. Some used the time to experiment and take note of ideas that worked or didn't work, some played on their computers, ignoring the materials on offer to them, some did not engage in the project at all, while others immediately began to construct their instrument, determined to finish their project as quickly as possible. Mia, Sameer, Tim and Josh found a long, narrow cardboard box that had housed a new flute and asked for a pair of scissors and a craft knife so that they could begin construction, before thinking about potential problems.

Lesson 2: Findings

However, Lesson 2 showed that the students' willingness to listen, to and learn from, one another continued to grow. They shared ideas with less trepidation and appeared to be more accepting of each other's ideas. I also noted a general improvement in the student's conceptual understanding, a greater sense of abstraction (see page 8) in the way they described the competencies. Their ability to execute, on the other hand, developed more slowly than Cycle 1 had led me to believe, which may have been due to the freedom, lack of structure, and excitement of new access to unusual tools and materials. It meant that students did not manage to complete their work in the assigned time, however. As a teacher, I was anxious to regain control of my rather chaotic classroom, but as a researcher I knew that allowing the students to work through the difficulty of being responsible for their own behaviour would serve them better in the long run.

Lessons 3 and 4: Electrophone Design (14 and 20 March 2019)

Research Goals
• To what extent are students able to regulate their behaviour and execute their objectives in an unstructured lesson?
• Did the students engage in productive communication and collaboration with their groups?
• Were the students able to generate creative and innovative designs?
• To what extent did students critically consider how their instrument would work?
• How successfully were students able to navigate the information regarding expectations, parameters and
• Did the students exhibit a sense that they were considering their actions and modifying their behaviour to generate better results?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving Decision Making Reasoning & Argumentation Interpretation	Communication Collaboration	Initiative Self-Direction Productivity Perseverance Responsibility Self-Regulation	Information Literacy ICT Operations & Concepts	Creativity Innovation Flexibility Metacognition Curiosity

Lessons 3 and 4: Description

The Lesson 3 and 4 worksheet (seen in Figure 4.29 on page 121) contained a variety of design prompts in the form of questions about the physical appearance of their instrument and the sounds it would make, how these would relate to one another, and whether the instrument would work. This worksheet was collated in a file with the project instruction worksheet, competency definition worksheets and self-assessment rubrics from the previous few lessons. While this was quite a lot of information for the students to contend with, I wanted to ensure that they had access to a large amount of paperwork so that I could observe how they managed this large quantity of information, as well as assess their information literacy. They were having difficulty thinking about what sounds their instruments would make and so I began Lesson 4 with a brief inquiry where we asked, 'what constitutes musical sound?'.

Even though the class and I had spent quite some time discussing timbre during the first research cycle, the students could not seem to wrap their heads around the idea of describing the type of sound their instrument would make. I had this exchange with Sameer, Mia, Tim and Josh:

Sameer:	Every time we touch them it will play A, B, C, D, or a G. And then the earth is going to be on the corner so when we hold it [demonstrating how the instrument will be held] the earth will be here and then we can play it.
Teacher:	So is it going to be a wearable instrument?
Sameer:	Yeah
Teacher:	Great, so you said it would play an A, B, C, and D. But what sound will it make? Think about what that element is called. [confused looks from students]
Teacher:	Remember timbre – the quality of the sound.
Sameer:	Oh yeah… it's going to make a high pitched sound.
Mia:	Yes. It will definitely make a very high sound.
Teacher:	Okay, but what kind of sound? Will it sound like an instrument or something else?
Mia:	We still need to discuss that…
Sameer:	Yes, but I'm pretty sure it's going to be a woodwind.
Teacher:	Remember it doesn't necessarily have to make an instrument sound. You can use any sound. So I really like this. I don't know of any other wearable instruments. I like how you're thinking out of the box with your design. Now think out of the box with your sounds too.
Tim:	Well, actually we're in the box with our design.
Teacher:	Yes, I suppose you are. So keep your arm in the box and your head out the box. (Class Observation Footage 14 March 2019)

In order to explore the idea of avoiding pre-existing sounds, I started our second design lesson by playing the students a number of musical examples and asking them to arrange their titles, which I had printed onto slips of paper, along a concept line[9] from more musical to less musical. These examples, which were presented as video clips so that the students could identify the sources of the sounds, included sound produced in traditional ways (flute solo), non-traditional ways (prepared piano, Inuit throat singing, Stockhausen's helicopter string quartet), with everyday objects (a length of vinyl hose, amplified cactus), and electronically synthesised (e.g. Ligeti's Artikulation).

Most students placed traditional instruments played in traditional ways closer to the 'more musical' end of the concept line. There was much debate around the remaining instruments: Was a violin making noises that did not sound like music, for example, 'more musical' than a sounding cactus? There were no right or wrong answers to the questions that the students asked, but the very act of grappling with them was highly beneficial, as

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[9] A concept line is a tool used in P4C (Philosophy for Children) which engages critical and creative thinking and decision making. Students are required to arrange manipulatives (in this case titles of music printed on paper) to tease out the nuances and hidden shades of the concept. The final arrangement of ideas does not have a 'right' or 'wrong' answer, but gives opportunities for students to expand their thinking, by wrestling with the concept, trying to give better and more refined reasons for their thinking, as they develop understanding.

well as introducing the notion that any sound could be considered a musical sound if that was the intention behind it.

Lessons 3 and 4: Observations

I spent Lesson 3 and 4 traveling from group to group, asking questions (as a researcher) and providing assistance where needed (as a teacher). Whenever I experienced an internal struggle between these roles, I was reminded that that in teacher research, the teacher is "an integral part of the context being studied, interacting with the informants in a process of co-constructing data" (Taber 2013, 174). Because it "makes sense", Taber continues, "to write an account where the researcher's role is recognized rather than obscured" (ibid), I endeavor to identify myself as either teacher or researcher when explaining my interventions in the descriptions below.

Below, I present the observations I made for Lessons 3 and 4 for each group. I have reproduced portions of Figure 4.2 at the beginning of each section as a reminder of the member of the group and these students' competency profiles (based on Cycle 1's observations). I will also briefly explain the factors that influenced my decision to construct each group in this way.

Lessons 3 and 4: Observations – Red Group
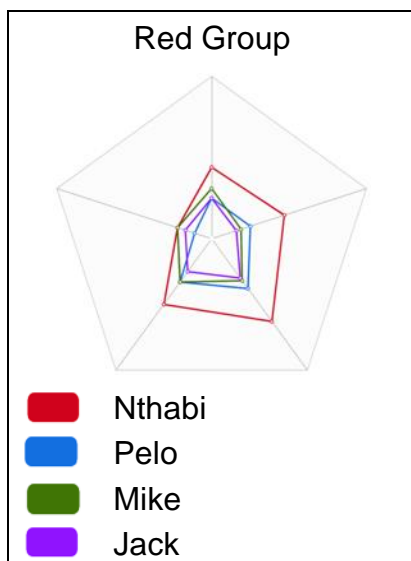
Figure 4.9: Red Group Cycle 1 Competency Profiles

When analysing the Cycle 1 Competency Profiles (Figure 4.9) I anticipated that Nthabi would emerge as the leader of the Red Group in Cycle 2, and she did take on this role early on in the design process. Jack and Mike were both intelligent and creative students, but lacked the self-regulation needed to work at optimum capacity. Pelo was an extremely quiet student and often seemed uninterested and disengaged from the classes. I hoped that working closely with Nthabi would help her to work on her ability to execute skills, particularly initiative and responsibility.

This group started by constructing their instrument before thinking through the design process. They attached a piece of venetian blind, as well as the bottom of a plastic container to a metal roasting pan, then attached their crocodile clips to sponges they had found on the recycled material pile.
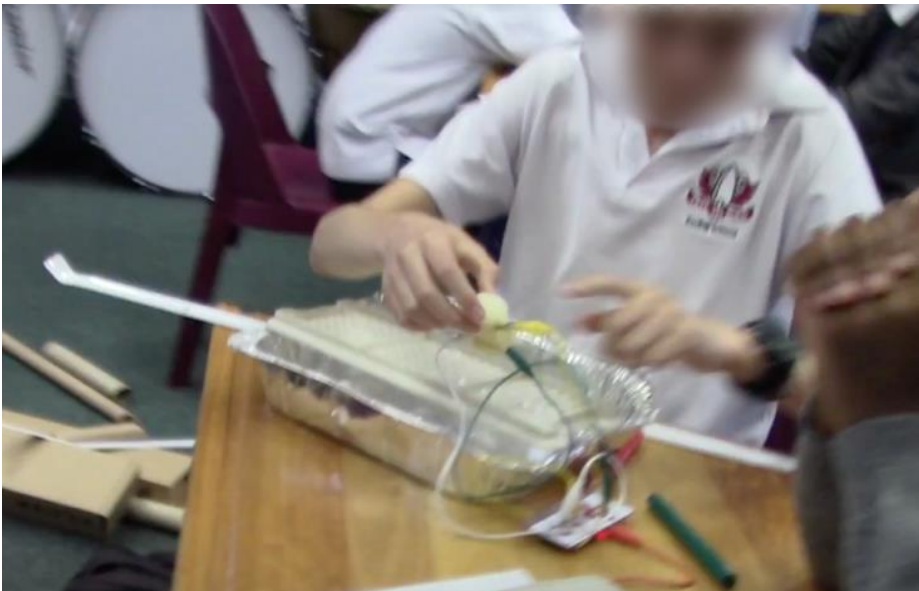
Figure 4.10: Red Group's First Instrument Design.

The group had not initially tested which of the materials they were using were conductive, and when they eventually did, they discovered that their design would not work. There was much reluctance to change the design, which they felt looked "cool and futuristic" (Pelo, Class Observation Footage 14 March 2019), but ultimately had to go back to the drawing board and design an instrument that would actually work.

Little progress was made during the second half of the first design lesson due to the ability to execute difficulties within the group. Nthabi did attempt to move her group forward, but was unsuccessful for the most part.

During the second design session, the Red Group decided to restart their design process. Nthabi explained that they had decided to not even look at the work they had done in the previous lesson and start with a clean slate. Nthabi had drawn a large organic shape in the middle of an A3 piece of paper and the group passed the paper from person to person, each adding an element to it. "We want it to be bonkers!" added Mike (Class Observation Footage 20 March 2019).

The group decided that the resultant image (Figure 4.11) looked like a duck and from this, came the idea to create a farmyard inspired instrument. Pelo was excited by this idea and exclaimed "I had a toy like that when I was little" (Class Observation Footage 20 March 2019). Trying not to dampen their spirits, I brought their attention back to the lesson's self-assessment rubric that had been handed out at the beginning of the session (Figure 4.12). I asked whether they thought that this idea would be considered 'emerging', 'developing', 'proficient', or 'exemplary' and, after reading the descriptors of each standard under the Capacity for Change competency, they decided that this was a 'developing' idea, rather than a 'proficient' or 'exemplary' one. While the self-assessment rubrics were an important assessment tool that contributed to the development of the competency profiles I constructed at the end of each cycle, I also found them to be an invaluable teaching tool that I referred to throughout the lessons. The fact that the students had had a hand in defining the competencies and had explored exactly what each competency meant added to their effectiveness in this regard.
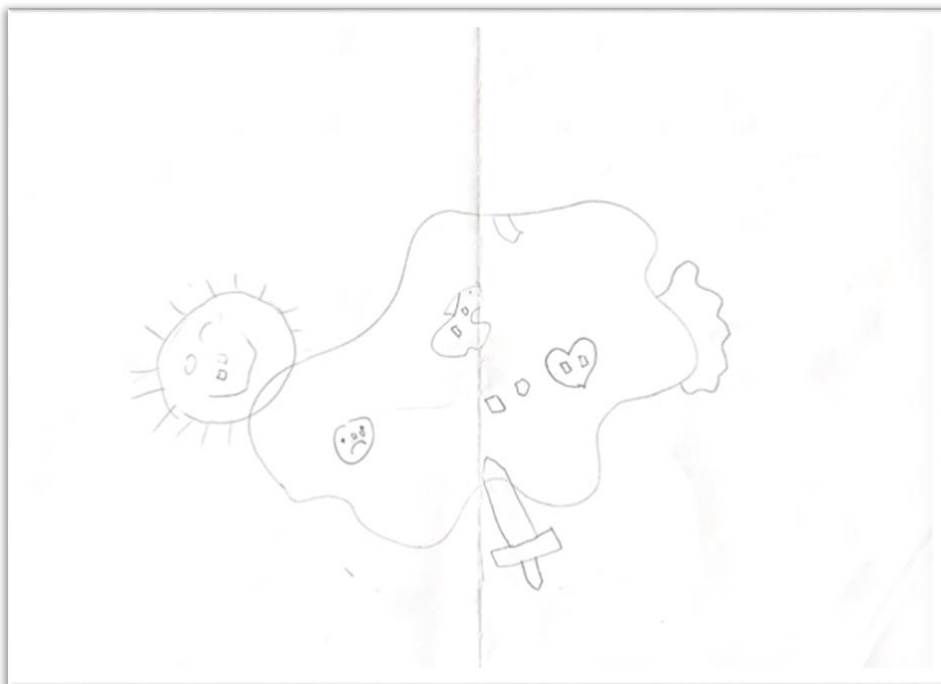
Figure 4.11: Red Group Second Design

Figure 4.12: Design Phase Self-Assessment Rubric

Unfortunately, while this valuable conversation was taking place, Mike and Jack spent their time throwing pencils at one another and did not engage in the conversation.

After some time, I revisited the Red Group to find that they had established a new idea. Nthabi had drawn a pond full of fish on her page and explained that each fish would represent a letter of the alphabet (Figure 4.13). "You'll push it and it will say 'A is for Angelfish', 'B is for Barracuda'" (Class Observation Footage 20 March 2019), she added. It was clear that Nthabi had come up with idea on her own as Pelo was lying with her head on the desk and Mike and Jack continued to kick each other under the desk. The freedom offered by project-based learning put self-regulation skills to the test and it was clear that the lack of structure and explicit instruction made concentration and sensible behaviour challenging for most students. I did not want to put on my 'teacher voice' and reprimand the students and would rather have let them come to see the negative impact their lack of self-regulation had on their work through their own reflection and self-assessment, but the lesson time was running out, and Nthabi, moreover, was becoming more and more frustrated with her group members. This was one of many instances where I felt an internal conflict between my roles as teacher and researcher. I asked the group for feedback on the idea, questioning how the instrument would make music. Nthabi responded by singing the alphabet. I could see her disappointment and frustration when I

inquired about the names of the fish that were supposed to follow the letters of the alphabet, and assured her that my act of poking holes in her ideas was not only my job, as her teacher, but also done to help her realise the best possible outcome and avoid problems during the construction phase. I encourage all members of the group to put their creative minds together in one last attempt at a creative and innovative instrument before the end of the lesson.
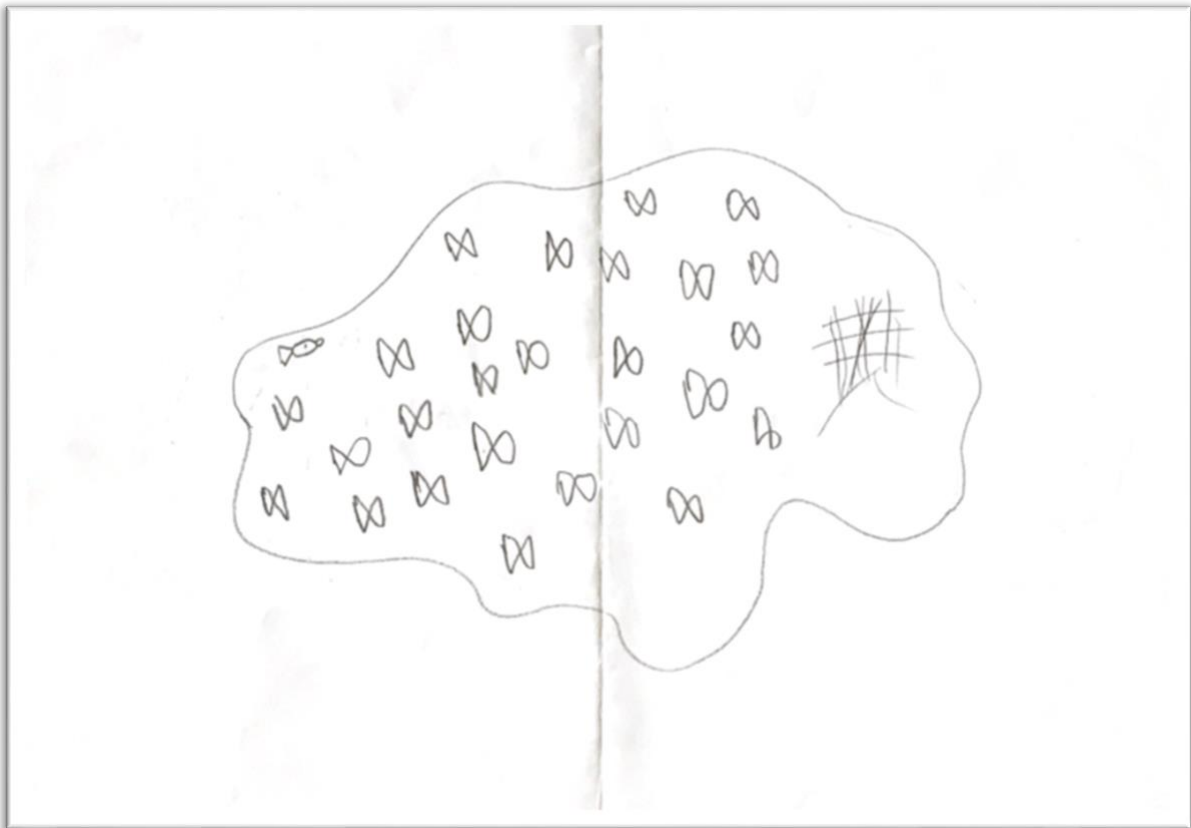

Figure 4.13: Red Group Third Design

The final design attempt that the Red Group managed to deliver before the end of the allotted time, was a 'remix machine' (Figure 4.14) that took single words from various popular nursery rhymes and allowed the musician to create their own song out of them. They indicated that the instrument would include a play button and songs could be recorded and played back after their construction. While the creativity and innovation I observed in this design idea was of a high level, I noted that the critical thinking behind the logistics of operating this instrument was flawed as their plan did not consider the capabilities and limitations of the hardware and software they would be working with.
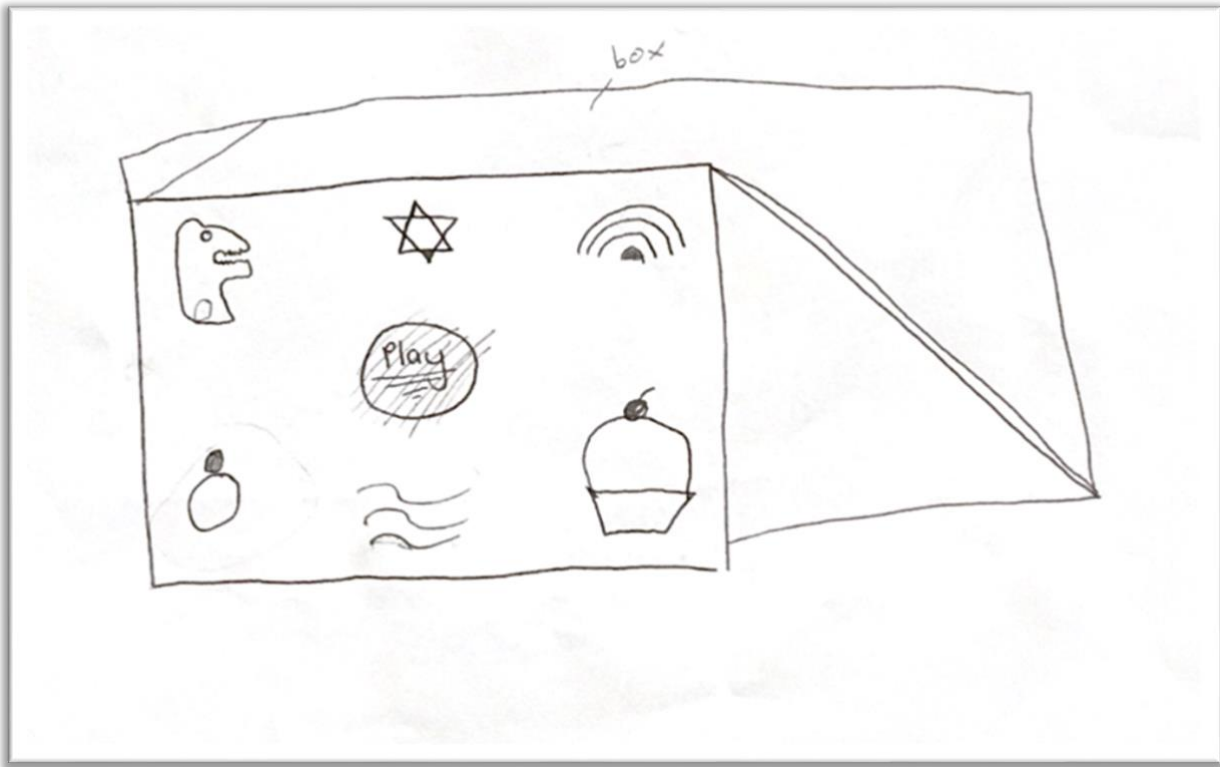
Figure 4.14: Red Group Final Design

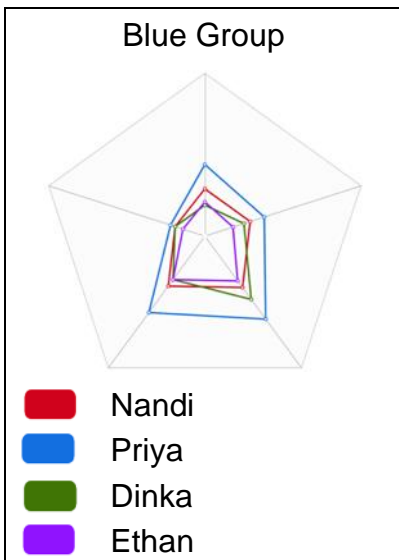## Lessons 3 and 4: Observations – Blue Group

Figure 4.15: Blue Group Cycle 1 Competency Profiles

The Blue Group consisted of Nandi, Priya, Dinka and Ethan. As can be seen from Figure 4.15, these students each possessed a different competency profile, but Priya was clearly the strongest student in the group. Priya and Nandi, however, were close friends and the temptation to turn the project into a social event was strong, forcing both of these students to work on their self-regulation skills. Ethan and Dinka were both wonderfully creative

students, but lacked the interpersonal skills to convey their ideas. I hoped to see both of these students stand up for themselves against the more domineering members in their group and ensure that their voices were heard.

The crossed-out image in the top left-hand corner of Figure 4.16 shows the Blue Group's first design. Ethan was thrilled to explain their idea of using pieces of venetian blinds to create an electric xylophone. As their teacher, I did not want to dampen the wonderful enthusiasm, particularly Ethan's, and so I asked the students to conduct some research and find out if a product like this already existed. A simple Google search showed that this idea had already been manufactured and produced by several companies and the group realised that they would have to think of another idea.
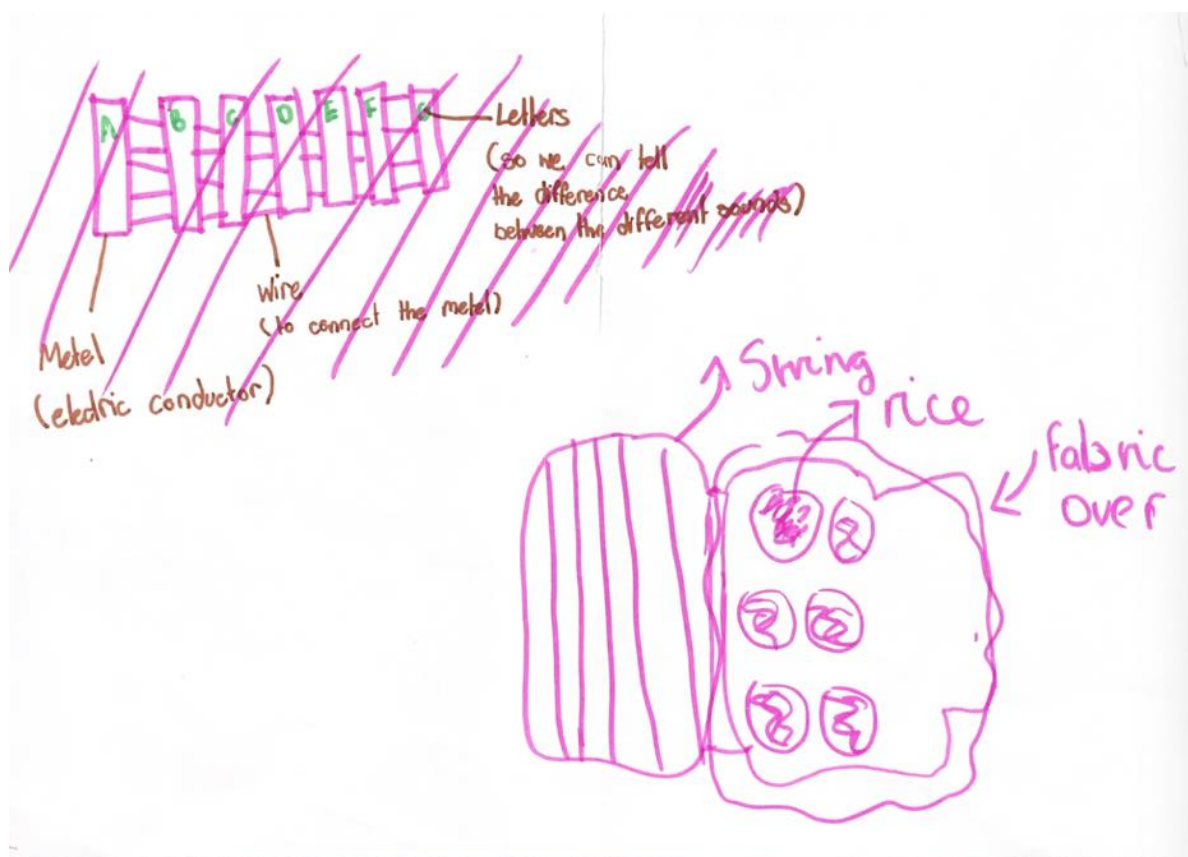

Figure 4.16: Blue Group – First and Second Designs

The Blue Group's second design can be seen in the lower right-hand corner of Figure 4.16. In an attempt to create something entirely novel, the students decided to design a hybrid instrument that was part shaker, part guitar. I saw higher levels of creativity and innovation in this design but the logistics of playing this instrument, and the failure to meet project expectations, showed a lack of critical thinking and information literacy. Almost every piece of paper I had given the students had the word 'electrophone' printed in bold

across the top of the page. The students had also received explicit instruction on selecting conductive materials and ensuring that they used the Makey-Makey to trigger sounds that they would code using Scratch. This new design did not include any electronic elements. Once again, I realised that as a researcher I would have liked to watch this idea play out and see how the students would come to this realisation on their own, but as a teacher, with limited time, I had to intervene and point out their error. The students seemed defeated and reluctant to change their idea, with Nandi commenting "Fine, let's just wrap the whole thing in tin foil so its conductive" (Class Observation Footage 14 March 2019), as I walked away.

Inspired by the 'what constitutes musical sound?' exercise at the beginning of Lesson 4, the group decided to create a soundscape instrument that consisted of two gear levers that triggered natural sounds on the one side, and man-made sounds on the other (Figure 4.17). I noted an elevated level of creativity and innovation in this project and observed the students consider potential technical problems with their design before thinking of possible solutions and workarounds.
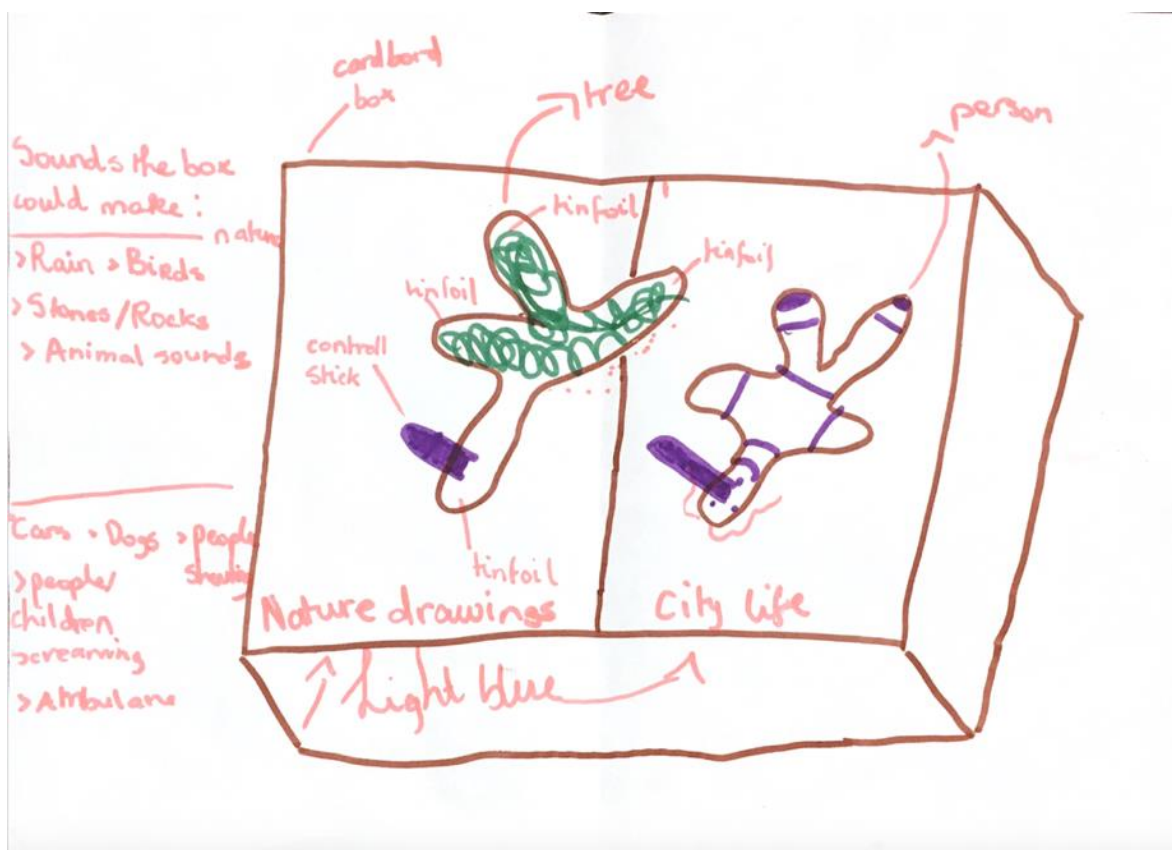

Figure 4.17: Blue Group – Final Design

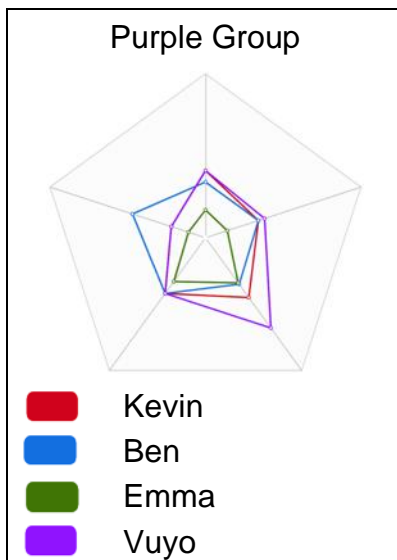**Lessons 3 and 4: Observations – Purple Group**

Figure 4.18: Purple Group Cycle 1 Competency Profiles

The Purple Group consisted of Kevin, Ben, Emma and Vuyo. This was one of the most diverse groups, with students showing significant strengths and weaknesses in different areas. Kevin was relatively strong in each of the five competency areas, while Emma was relatively weak. Ben was a gloriously creative student, but often lacked the self-regulation skills to complete a task successfully, while Vuyo was an incredibly conscientious student, but had not displayed a strong capacity for change in the first cycle.

This group was the first to begin with the sound they wanted their instrument to make rather than its design – a full orchestral sound that could be triggered through just one touch. They then divided an A3 page into four quadrants and each took a turn to present their ideas to the group (Figure 4.19) Vuyo proposed a large-scale instrument that consisted of multiple cardboard boxes that would trigger sounds when struck, Kevin presented a 'band in a box' idea, and Ben presented a design that looked like one instrument (piano or xylophone), but surprised the listener by sounding like another (full orchestra). Emma told her group that she could not think of anything and was happy to go with any one of their ideas.
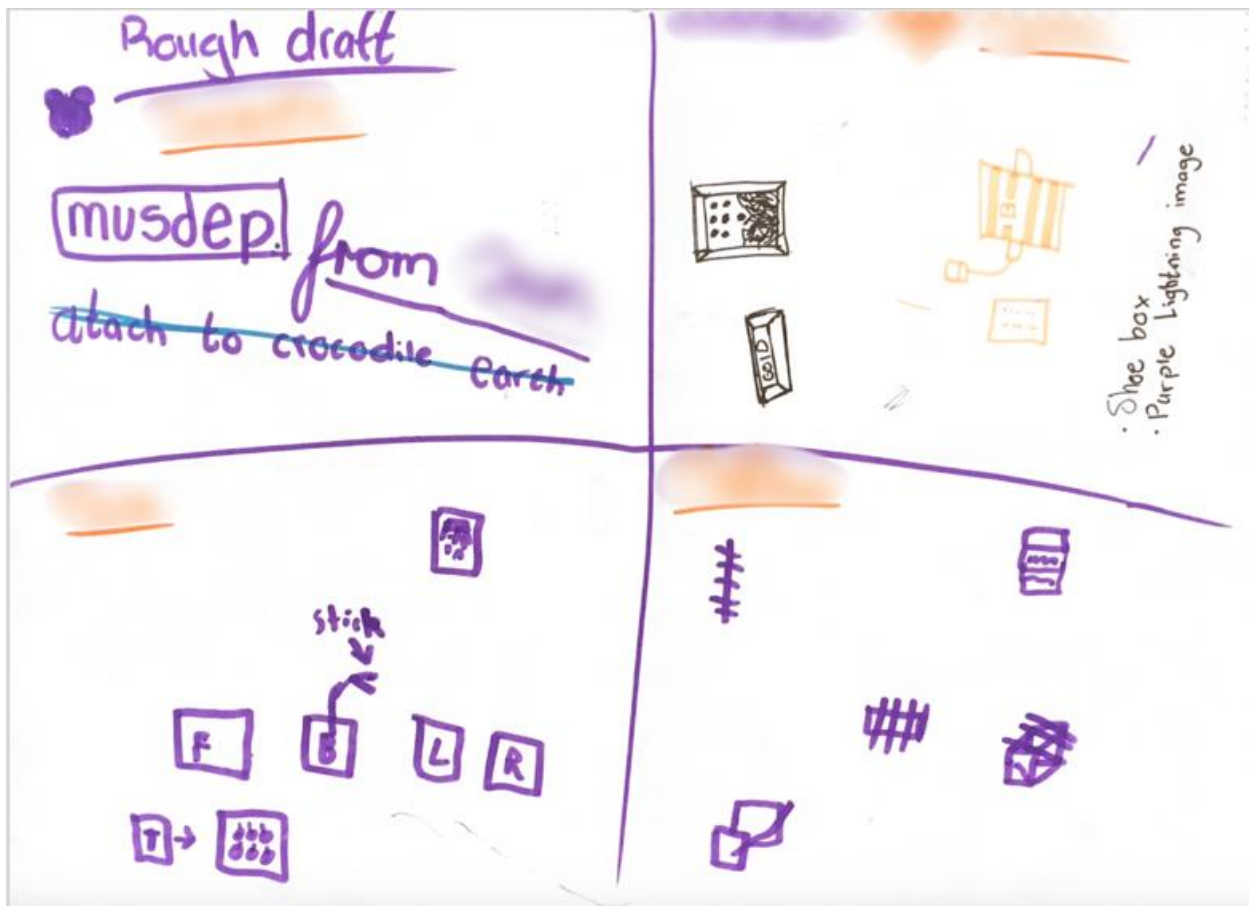
Figure 4.19: Purple Group – Initial Design Ideas

The group ultimately decided on Kevin's 'band in a box' design and began testing which materials would be best to trigger the sounds, as well as thinking about the overall look of the instrument. Ben, who took charge of the group and was clearly not ready to let go of his 'surprise' idea, insisted that the box have a 'rock 'n roll' design that included lighting, since it was an electrophone. Emma and Vuyo began working on this design brief (Figure 4.20), while Ben and Kevin sketched out the inner workings of the instrument (Figure 4.21).

At this stage, this group displayed the most developed competencies in interpersonal skills, capacity for change, analytical skills and ability to execute. Their idea was creative and well thought through, and each student contributed to its design.

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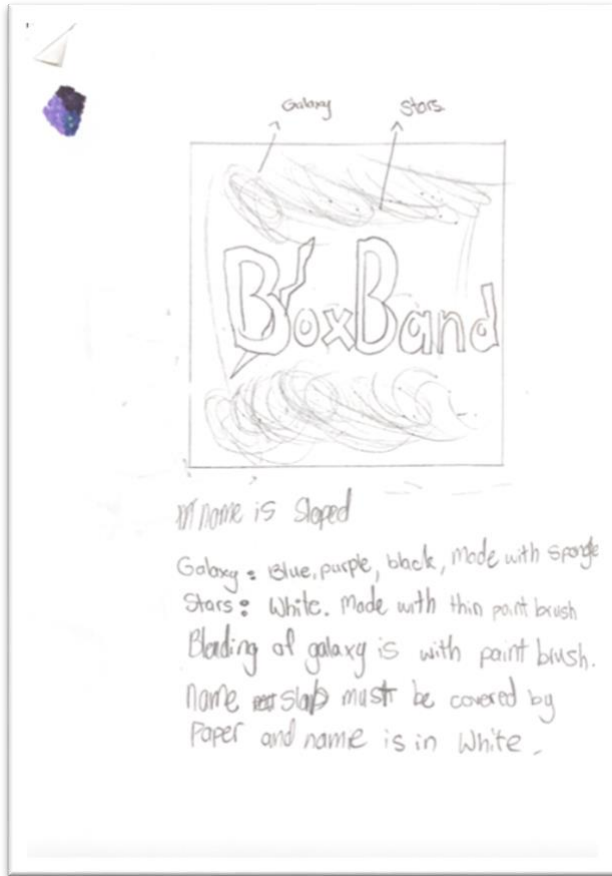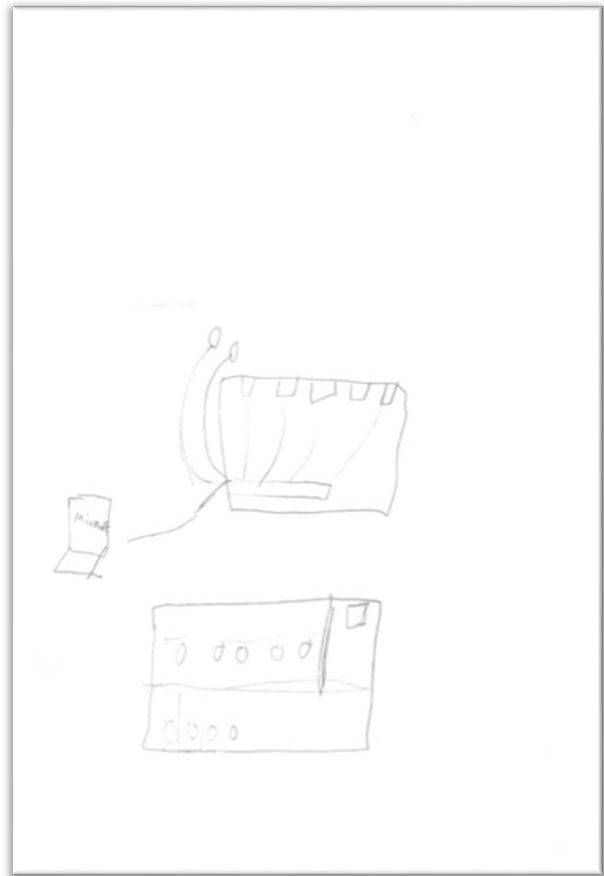
Figure 4.20: Purple Group – Final Instrument Design

Figure 4.21: Purple Group – Internal Workings of Instrument

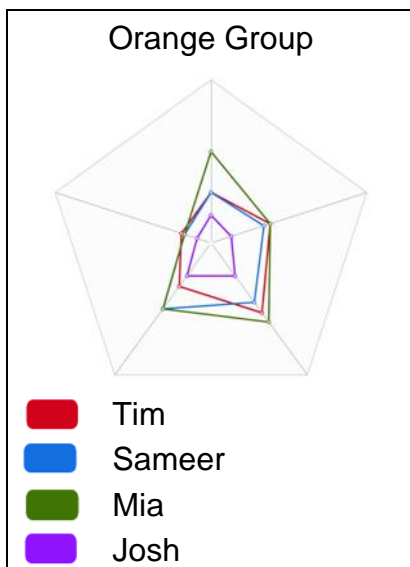## Lessons 3 and 4: Observations – Orange Group

Figure 4.22: Orange Group Cycle 1 Competency Profiles

The Orange Group consisted of three students with relatively strong competency profiles (Tim, Sameer and Mia) and Josh, whose profile was relatively weak. Mia and Sameer

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have strong personalities and I hoped that putting them in the same group would help them develop the skills of collaboration and negotiation. Tim, a much quieter student, nevertheless tried to make his voice heard throughout the design process.

Sameer decided to create an electric flute out of the cardboard flute box and without consulting his team, sketched out the idea seen in Figure 4.23.
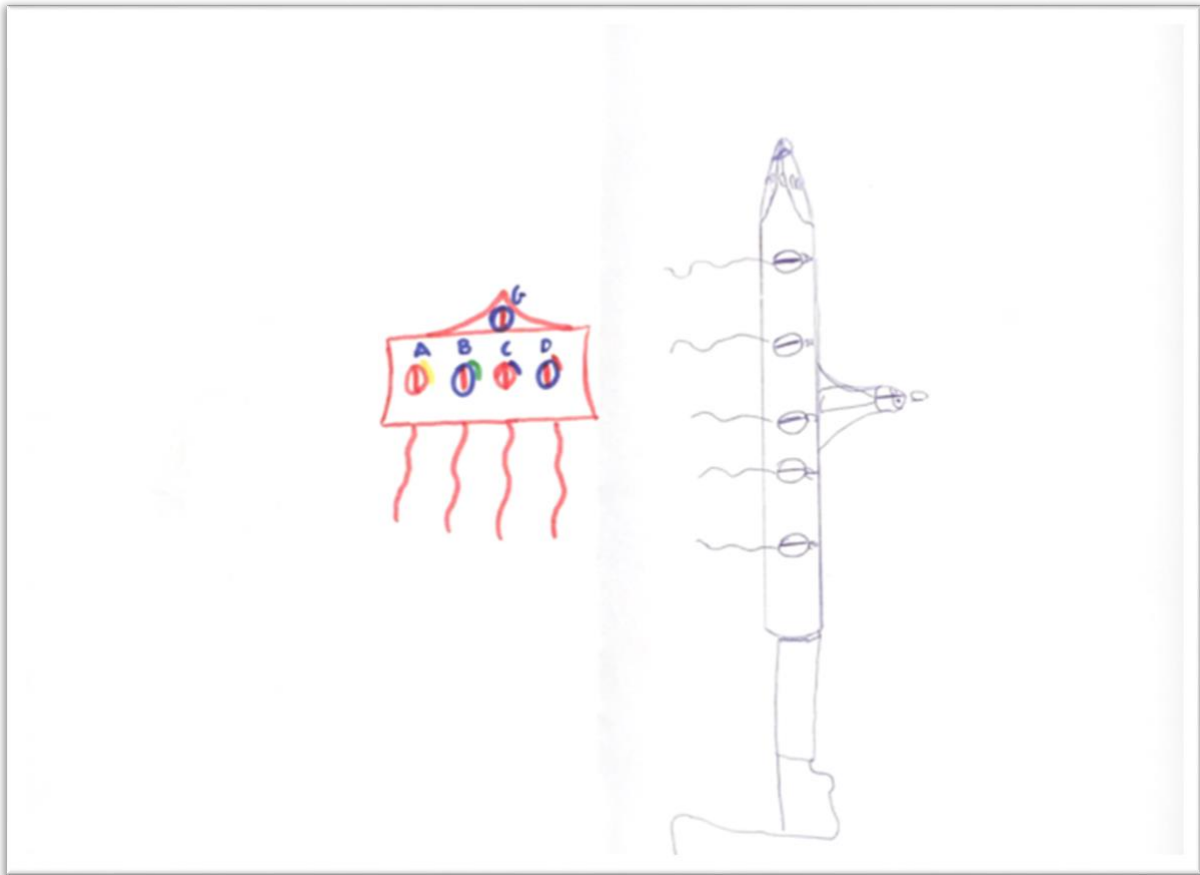
Figure 4.23: Orange Group – First Design

Sameer was so impressed with his design, he loudly announced that his group was finished. I went over to their workstation to find both Josh and Tim staring off into the distance, while Sameer animatedly explained his idea to Mia. As a teacher, I asked several questions about the design, wondering why one would have to blow into the instrument if the sounds were going to be triggered electronically and why they were making an instrument that looked and sounded like a flute. When I asked the group to refine their idea, there were eye rolls and a frustrated sigh from Sameer.

By the end of the first design session, however, this group had made impressive progress, designing a wearable instrument (Figure 4.24).
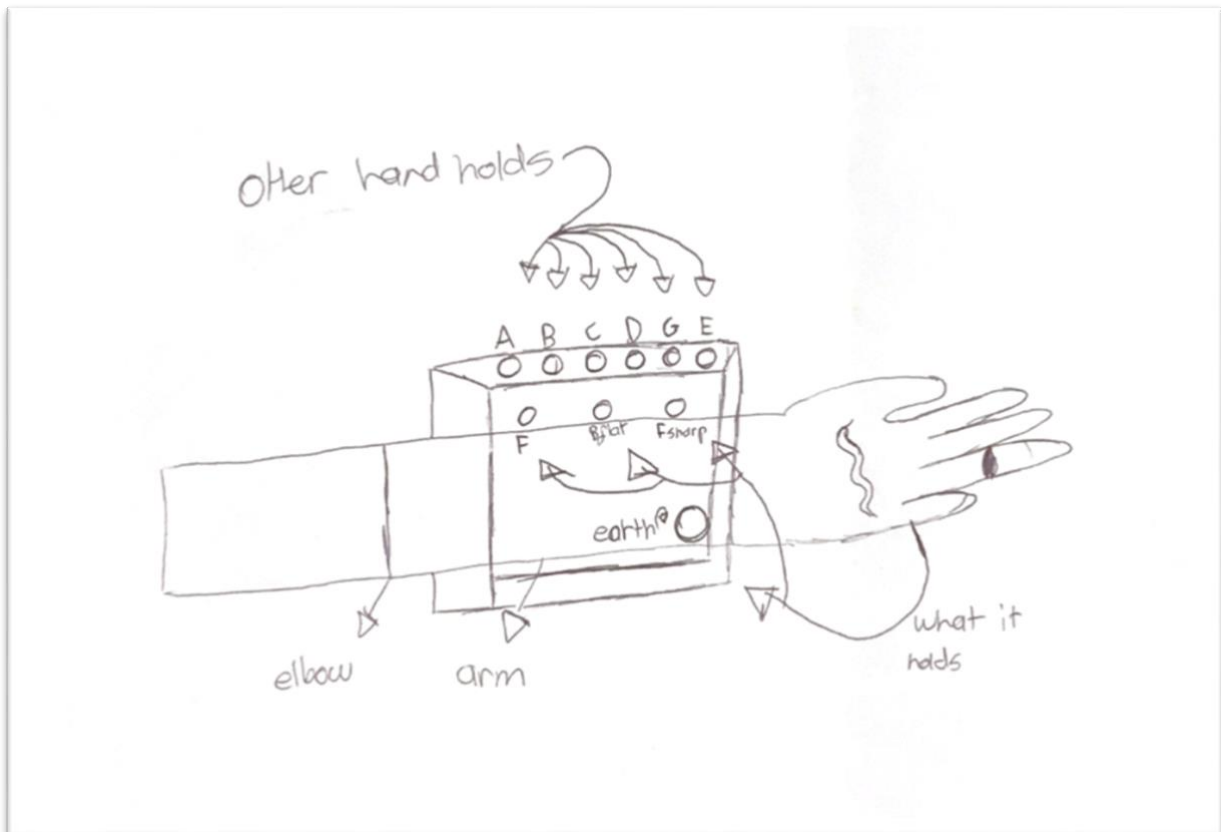
Figure 4.24: Orange Group – Second Design

The group was still struggling with the notion of what sound their instrument would produce, with Sameer determined that, since the box had held a flute, it should make the sound of a flute. This prompted me to begin the second design session (Lesson 4) with the 'what constitutes a music sound?' exercise, but sadly, this had little impact on the group who, at Sameer's insistence, decided to still use flute sounds for their instrument.

Throughout the design phase, there was constant conflict between Josh and the others. Sameer became more domineering and took over the project, mostly supported by Mia. Tim tried to contribute but eventually began to withdraw, while Josh did not attempt to contribute. Sameer then started a 'behaviour score board' (Figure 4.25) which he marked every time he felt someone was distracted or not contributing.
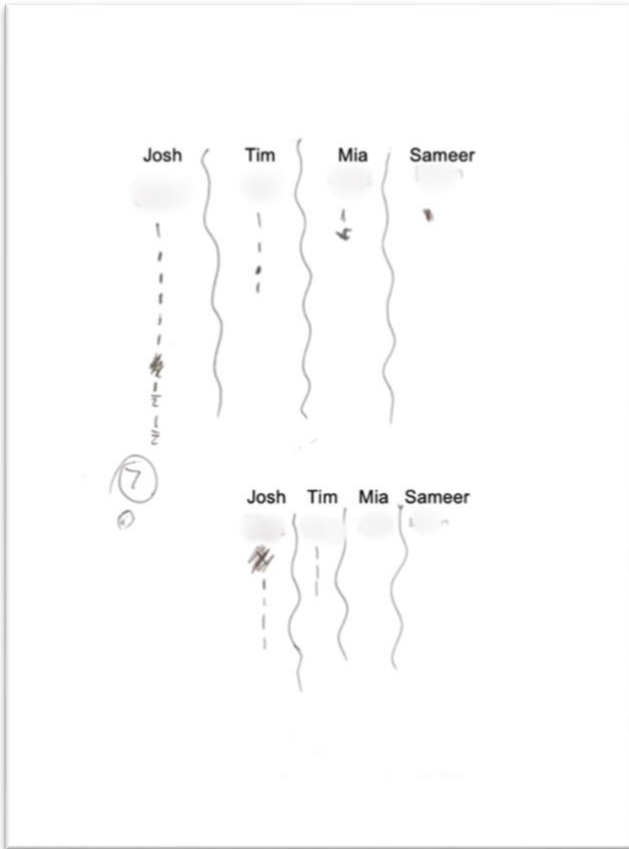
Figure 4.25: Orange Group – Behaviour Score Board. (Image edited to obscure student's real names and add pseudonyms in their place).

Despite the deficit in these students' interpersonal competencies, and Sameer's inflexibility, the final design was well thought through and it seemed that all potential technical problems had been considered and accounted for.

Lessons 3 and 4: Observations – Yellow Group

Figure 4.26: Yellow Group Cycle 1 Competency Profiles

The Yellow Group, which consisted of Travis, Lesedi, Kylesh and Paul, struggled to get into a rhythm of working with one another. Lesedi, as you can see from the cycle 1 competency profiles in Figure 4.26, was an extremely capable young lady, while the three boys in the group had demonstrated considerably less competence in the first cycle.

Both Paul and Kylesh seemed fascinated by the sounds that the venetian blind slats made and spent most of the first design session shaking, scraping and banging objects toget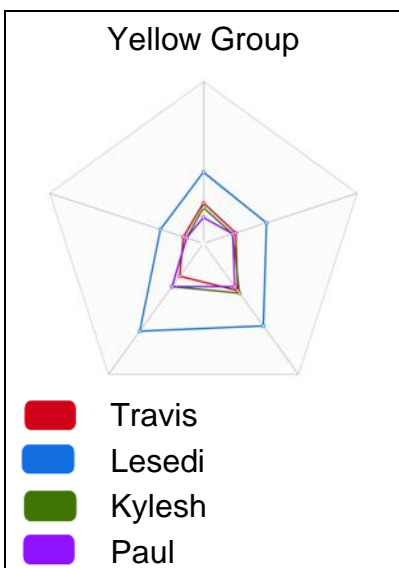her. As a teacher, I made several attempts to explain that their instrument had to make sound through electronic triggers, but with little success. Lesedi and Travis, both of whom are very social students, spent their time walking around the class to see what other groups were doing. Eventually, wearing my teacher rather than researcher hat, I insisted that they all regroup, put the materials aside, and reread the instructions.

I was distressed, sometime later, when Kylesh explained that the concept they had arrived at was to "attached the clips to the blinds to make it meow". The 'meow' sound that Kylesh was referring to was the default sound that Scratch made when it first opened. Meanwhile, students in the other groups had already discovered that the slats were not conductive enough to trigger sound. By the end of the first design session, the Yellow Group had not made any progress in their design.

During the second design session, Lesedi and Travis began sketching various options (Figure 4.27) while Paul banged on the desk and Kylesh stared off into space. Eventually, Lesedi suggested the idea of a fold-up instrument that could be transported. "Like a musical book!" added Travis. I encouraged them to explore this idea, adding that they should each create their own a page in the book, in an attempt to illicit some work from Paul and Kylesh. Paul's response was that he did not know how to write music, illustrating that he had not really understood the idea that the book was the actual instrument, not a set of instructions to make music on another instrument. Sensing the apprehension from Kylesh, Paul and Travis, who did not have the same musical experience and prowess as Lesedi, I suggested that a nature scene that could be included in the book, encouraging them to think more broadly about what natural sounds could be used in their book. Most of the group seemed excited by this idea, but Paul shook his head, noting that he could not draw, so did not know how he was expected to make a musical picture.
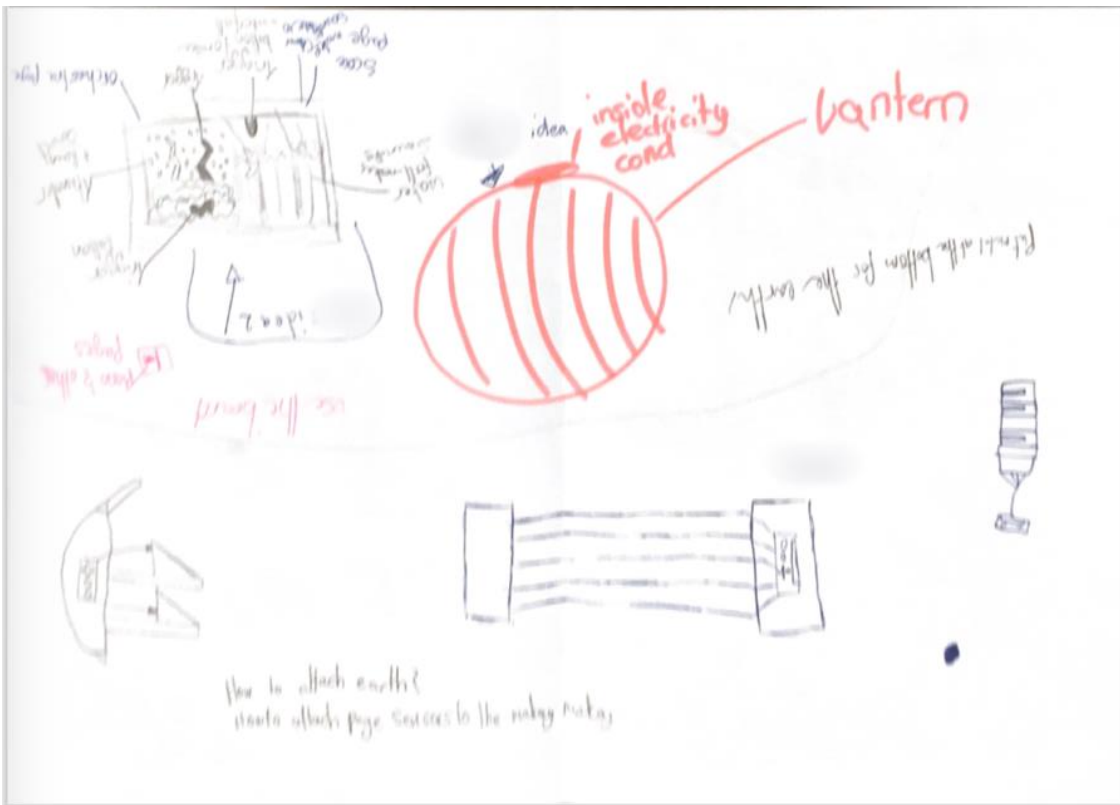
Figure 4.27: Yellow Group Designs

The second lesson came to a close with the Yellow Group the only one that had not finalised their idea and so I asked them to find time outside class to do so. The main competency deficit I noticed was in their ability to execute and I was struck, once again, by how a failure in this competency area made it more difficult for me as a researcher to observe competencies in the other broad areas.

Lessons 3 and 4: Observations – Green Group
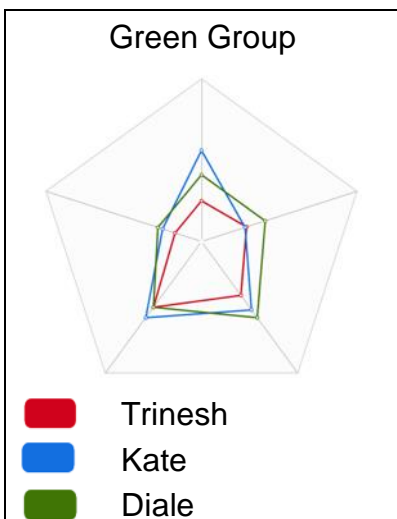
Figure 4.28: Green Group Cycle 1 Competency Profiles

I had high hopes for the Green Group, which consisted of three students who had demonstrated strong competency profiles during the first research cycle (Figure 4.28). Kate, Trinesh and Diale are intelligent and confident students and, as a teacher, I expected an impressive design from them.

Their initial design (Figure 4.29) failed to meet the requirements of the project, however, as their aim was to "tune the strings of a piano to sound like a harp" (Class Observation Footage 14 March 2019). When I reminded them that this design had to include electronic elements, they decided to add "piano keys that would trigger electronic harp sounds" to the harp design. These keys were to be made out the dreaded venetian blind slats, which this group had also (inaccurately) assumed conducted electricity.

Figure 4.29: Green Group – First Design Plan

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I used the self-assessment rubric (Figure 4.12) to ask the students how they felt their design would be rated in terms of the critical thinking and creativity they had displayed. Again, this assessment device proved instrumental in the teaching process, since the students agreed that they were capable of a better concept, and began discussing other options.

Trinesh was absent in the second design lesson, leaving Kate and Diale to come up with the new design. After a major argument, they positioned themselves on opposite ends of the class, informing me that they had "got divorced" and could not work together anymore. As a teacher, I insisted that they mend fences and come up with an idea, although their behaviour had wasted a lot of time and the second design lesson was nearly over. When I returned to them later they said that they were making a fish mobile that would make a sound when the fish were squeezed (Figure 4.30). Observing a lack of critical thinking, I asked how squeezing the fish would trigger an electronic sound. Diale admitted that they had not decided what sounds these fish would make and I tried to prompt a rather obstinate Kate by asking some questions:

Teacher:	Why are we making this instrument? What is it for?
Kate:	Fun
Teacher:	Okay, what makes it fun?
Kate:	Because its fish.
Teacher:	Okay, but why is it fish?
Kate:	We didn't really know what else to do. I'm busy looking for a sound for a seagull. (Class Observation Footage 14 March 2019)

In an attempt to help them find a concept to tie the instrument together, I continued:

Teacher:	Do you know what I'm thinking of when I see this…is about our poor oceans and what a state they're in.
Kate:	I guess.
Teacher:	Okay, so maybe the purpose of this instrument could be to bring awareness to that (ibid).

Kate looked incredibly bored, but Diale responded, saying that they could create and record ocean sounds using plastic that could be triggered through their fish: the first instance of creativity or critical thinking I observed from this group.
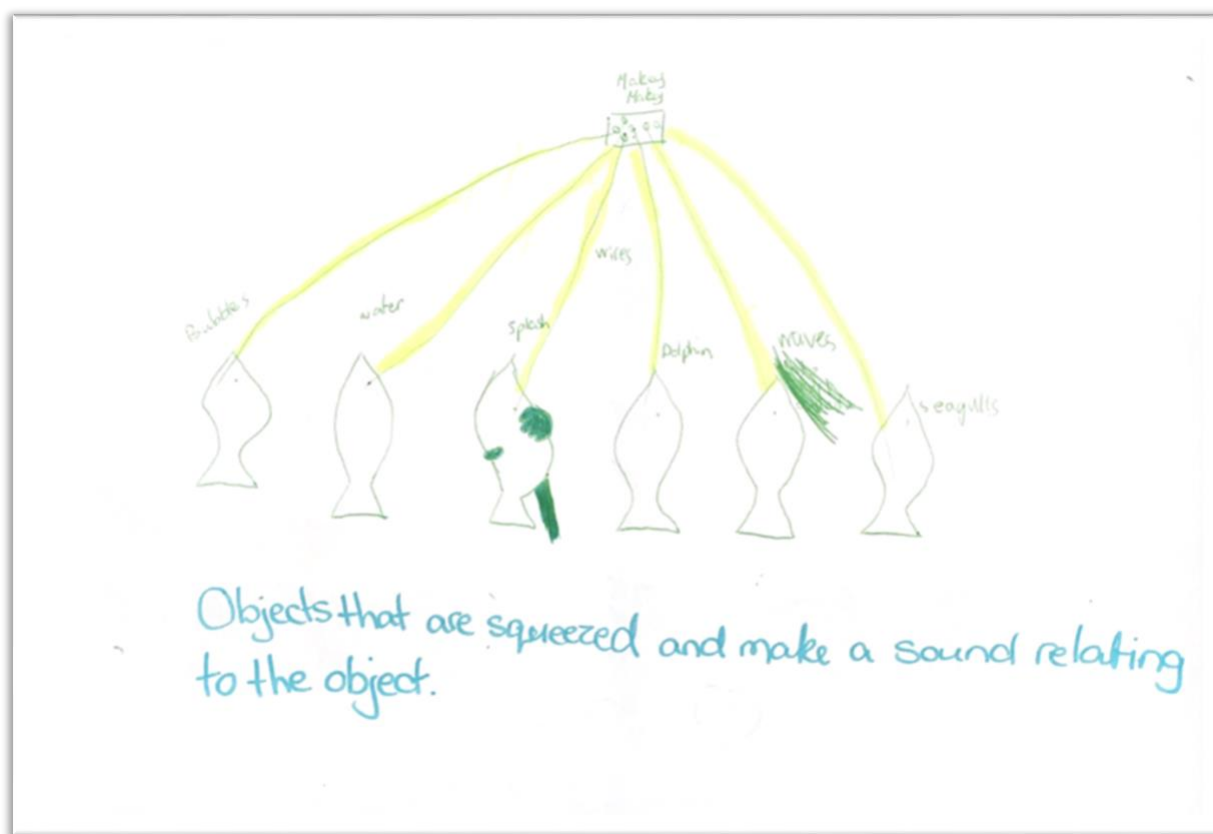
Figure 4.30: Green Group – Second Design

It was interesting to note such a distinct lack of initiative, creativity and collaboration, particularly from Kate, who carried one of the most 'advanced' competency profiles from the first research cycle. It was clear that this incredibly talented musician wanted to showcase her talents, rather than being pushed to grow and challenge herself in different, sometimes uncomfortable, directions.

Lesson 3 and 4: Findings

Lessons 3 and 4 provided many valuable insights that informed the construction of the competency profile maps, that I will present later in this chapter.

Generally, I noted a resistance to change in most students. The idea of being asked to improve on, or rework an idea, seemed foreign to students and many seemed reluctant to persevere when I pointed out problems or improvement potential in their design. Students generally did persevere, sometimes begrudgingly, and they ultimately realised that this added effort resulted in better designs. When reflecting on this process in the Term 1 Focus Group, Nthabi commented:

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> You kind of… weren't just taking our first design because you knew we could do better. So… you would make us work harder to get a better design. And we had to kind of… when you said you could change this… we had to kind of analyse... How could we change it? (28 March 2019)

My teacherly insistence that students continue reworking their ideas affected the visibility of their 'capacity for change' competencies. I was able to observe improved levels of creativity and innovation in each of the design iterations formulated by the groups. Here, I noted that it was not only the ability to execute the competency of self-regulation that impacted the observability of other competencies (as I had noted before), but also perseverance. The students were able to develop creative and innovative ideas, but this would not have been seen if they had not persisted. When reflecting on the design phase of the project Nandi noted:

> I think really creativity is what I learned. Like that you must think outside the box and you mustn't always stick to the same idea and you must be open minded (28 March 2019).

Additional findings included a sharp decline in most students' self-regulation skills, which resulted in poor productivity in many cases. But, perhaps this was par for the course. In some groups, one group member's lack of responsibility and productivity seemed to illicit an improvement in their teammates' competencies, as they compensated for the one another's deficits. In other cases, students who had shown well developed ability to execute competencies in Cycle 1 were swayed by their teammates and showed a sharp decline in these competencies.

I observed various levels of analytical skills in the different groups. While some students carefully considered how their instrument would work, others made inaccurate assumptions about the capabilities of the technology they were working with and were unable to foresee the potential problems this would cause.

Students also collaborated and communicated with one another with varying degrees of competence. Some groups provided an opportunity for each member to share their ideas, while others fell victim to an overbearing leader. In other instances, no clear leader emerged, and the group struggled to find their way forward.

An unexpected observation was that some of the students with advanced prior musical experience found this task extremely challenging and showed a sharp decline in each of their competency areas. This finding will be discussed in more detail in Chapter 7.

Lessons 5, 6 and 7: Design Presentations (25 and 28 March and 3 April)

Research Goals				
Presenting Students: • To what extent are the students able to explain their design ideas to their classmates? • Can the students show that they had critically considered how their instrument would work? Observing Students: • Are the students able to identify potential problems in the instruments being presented? • Are students able to regulate their behaviour and focus on the presentations?				
Analytical Skills	**Interpersonal Skills**	**Ability to Execute**	**Information Processing**	**Capacity for Change**
Critical Thinking Problem Solving Decision Making	Communication	Self-Presentation Self-Regulation	Information Literacy ICT Operations & Concepts	Creativity Innovation Metacognition

Lessons 5, 6 and 7: Description

The class presented their instrument designs over the course of three lessons. This process took longer than anticipated, but I did not want to cut the insightful question and answer sessions that followed each presentation short.

Lessons 5, 6 and 7: Observations

Red Group

As was expected, Nthabi, who had emerged as the group's leader, did most of the talking during the presentation. She explained how the group had come to their idea and drew the instrument design on the white board. Jack, who suffered from anxiety and did not enjoy speaking in front of the class, nevertheless explained how the instrument would be wired and coded. He became flustered and stumbled over his words but persisted and was able to communicate his points. Neither Pelo nor Mike contributed to the presentation at all.

The audience was quick to find fault with several aspects of the design, with Trinesh noting that they had not mentioned how they would earth their Makey-Makey, Lesedi noting the unoriginality of using pre-existing songs, and Kevin inquiring whether this use would constitute a breach of copyright. Several students noted that the idea of having a button to allow you to record and playback a song you had created would not be possible with the capabilities of Scratch and Makey-Makey.

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Nthabi acknowledged each of these questions as things that the group still needed to consider and address, while Mike entertained the class with outlandish answers. When asked how they planned to earth the Makey-Makey, Mike said they would "paint it using your blood". His response to questions about ensuring that their instrument would be original was, "We'll put it on the half past clock". Each response was met with raucous laughter, which only seemed to spur him on. My teacherly reminders about self-regulation and self-presentation skills did little to deter him.

In addition to offering critiques of the design, some students offered solutions to problems raised. Mia suggested that rather than using snippets of pre-recorded nursery rhymes, the group code portions of the melody using Scratch. Ben also suggested a way that the playback function could be coded, but noted that its functionality would be more limited than the group wanted.

Blue Group

The Blue Group's soundscape instrument was a complex design and although each member of the group had the opportunity to speak, they did a poor job of explaining how the instrument would work and what the concept behind it was. This left their audience confused and caused disengagement during the Q&A session.

Mike, on a high from his performance during his group's presentation, used the silence to ask irrelevant questions such as, "what if a young child takes a knife and slashes it?", "What if it runs out of batter?", and "What if it catches fire?".

Purple Group

The Purple Group divided up the presentation between three of its four members, as Emma did not feel comfortable speaking in front of the class. Vuyo started the presentation by explaining the group's concept, before Ben took over and explained how the instrument would be coded. Finally, Kevin explained how the instrument would be wired and how sound would be triggered. This clear and succinct presentation ended with Ben listing some of the problems he foresaw, noting that they still needed to find the best solutions. This was the highest level of critical thinking and metacognition I had noted in any of the presentations.

As this presentation had been so thorough, the audience struggled to offer any pertinent suggestions. Most questions revolved around general wear and tear, such as "If one of the screws comes loose, will it need to go in for repairs?", that could have been asked about any of the instruments. Ben shut each of these irrelevant questions down with an impressive level of courtesy, despite seeming irritated. Lesedi offered a more considered question about how the transposing instrument within the orchestra would be treated, to which Ben replied that the sounds would all be synthesised and all instruments would be triggered at concert pitch.

Orange Group

Before the Orange Group started their presentation, Josh and Tim approached me, explaining that they felt that their voices were not being heard by the other two members of their group. I encouraged them to keep trying to get their points across, as this was an important skill to develop and mentioned that this could easily be a 'real world problem' in the future, so they should use this opportunity to learn how to collaborate with people they did not necessarily get along with.

The tension between Sameer and the rest of his group was obvious throughout the presentation. Mia began introducing the instrument, but, as soon as Sameer finished drawing it on the board, he interrupted her and took over the presentation.

The audience offered several interesting observations regarding the customisation of a 'wearable instrument', as well as the logistics of wiring traveling along the inside of the box where the arm would sit. When Sameer was unable to answer a question, and when his teammates also failed to offer a satisfactory answer, he made derogatory comments such as, "Clearly Josh wasn't paying attention when we were working on the design". Despite, or perhaps because of, this group's personal conflicts, each student gained something by going through the presentation, as I show later.

Yellow Group

Lesedi presented the Yellow Group's book design, noting that the instrument would include a 'rainy-day' page that would allow someone to make music with wind, rain and thunder sounds, as well as a piano page that would teach you to read and play music. When asked if the other members of the group had anything to add, Travis commented:

"Well, to be honest, last lesson we didn't know much about this thing at all. It was Lesedi's idea. We're very confused" (Class Observation Footage 03 April 2019).

The class asked many questions regarding the construction of the instrument, unsure of how the group would incorporate the Makey-Makey into the book and wire triggers on multiple pages. Despite his lack of involvement in the initial design of the instrument, Travis was able to offer several insightful answers regarding the technical logistics. Neither Kylesh, nor Paul contributed to the presentation at all.

Green Group

Diale began the Green Group's presentation, pitching their instrument as a tool to bring awareness to the pollution in our oceans. Kate sketched out the fish mobile on the white board while Trinesh explained that squeezing each fish would trigger an ocean-themed sound. I, along with the rest of the class, was dubious about the idea of squeezing the fish to trigger the Makey-Makey, which required the formation of a closed electrical circuit in order to make sound. Trinesh was convinced that his idea, which included tinfoil, playdough and paper would work, but failed to explain it in a way that made sense to me or the class.

After Kate mentioned that the instrument would take the form of a mobile that could hang over a baby's crib, a number of students inquired as to the overlap between babies and environmental awareness. This seemed to be a point of contention in the group and something that required further clarification. Several students offered suggestions and alternative ways that the instrument could be constructed and triggered.

Lessons 5, 6 and 7: Findings

The observations I made in Lessons 5, 6 and 7 reaffirmed the Cycle 1 finding (see page 88) that feedback is, in some ways, seen as more constructive and easier to interpret when delivered by the students' peers. When reflecting on the presentations in the Term 2 Focus Group, a number of students noted the value of their classmates' suggestions. While this value was noted, the students did comment that it was sometimes difficult to accept such criticism:

> I think what I learnt is that… you need to be ready to accept constructive criticism and you have to like... be ready to hear what other people say (Nandi, Term 2 Focus Group 24 August 2019).

> I think it was actually really helpful to get criticised because for me when I get criticised, I usually get offended, but this sort of taught me to like not be as offended and to take it as like… help. (Vuyo, Term 2 Focus Group 24 August 2019)

> Ja… being told that there is a flaw in your design… that does kind of hurt, but when you think about it… like as much as it will hurt in the moment… you go back and you reflect and you… you know… they're actually right, there is a flaw. And obviously you don't like being told you're wrong, but it does help, and you need to learn to deal with it in the real world. So… I guess it's good to start now. (Nthabi, Term 2 Focus Group 24 August 2019)

I saw varying levels of competence when observing the students' presentation skills. The students' individual communication and information literacy competencies, as well as their general confidence level, played a role in their ability to explain their ideas and intentions. During the Term 2 Focus Group, Trinesh noted that he felt his analytical skills had improved through the exercise of presenting his project:

> I think we all kind of had to work on that during our presentations for what we're planning on for the instruments. 'Cause people came with questions that we didn't really think about. So then we had to think about that and work it into our project (24 August 2019).

Indeed, I noted that when confronted by questions from their peers, a number of students exhibited a more advanced level of critical thinking and problem solving than I had observed during the design phase.

Instrument Karate: Yellow Belt (Due on 3 April 2019)

Research Goals
• Is the student able to present themself in a confident and professional manner?
• To what extent has the student engaged with and applied the information presented in the flipped classroom material?
• Did the student show evidence of having worked through challenging aspects of the task?
• Could any indications that the student had considered and corrected their process be seen?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance	Information Literacy	Metacognition

Instrument Karate: Description

As the students worked on their instrument designs in class they also worked on their instrumental skills at home, using the flipped classroom videos and workbook. I checked in on their progress throughout the second cycle and assisted with queries and technical issues, such a broken reeds and leaking spit valves. In order to receive a Yellow Belt, the students had to play five passages of four bars each. These were constructed out of the first three notes traditionally learnt on each instrument, and were played in various combinations of crotchets, minims, dotted minims and semibreves. The Yellow Belt chapter form the Clarinet Book can be seen in Figure 4.31. This chapter was also taught in an online video.

Figure 4.31: Clarinet Yellow Belt

Although I set final due dates for each of the karate belts (shown in Table 3.3), I encouraged students to go at their own pace, submit each belt as soon as it was complete, and move onto the next. Some students quickly forged through them, eagerly collecting the small fabric belts that were worn as badges of honour on their blazers, but

other students found it challenging to film themselves performing and needed to be nagged for each belt.

Instrument Karate: Observations

Josh was one such student: I only received his Yellow Belt clarinet video after several verbal and written requests. When I saw it, I was amazed at his perseverance. Most of the students presented all five passages in one recording, whereas Josh had clearly struggled with each passage individually before recording it, as could be seen from the dates of the recordings, which he did over several days. The sighs of relief from both Josh and whichever parent was holding the camera during that particular session also indicated that the clear, well-presented final products had taken a great deal of effort to achieve. My experience of Josh up until this point had indicated that he was disinterested in his work and unwilling to invest any time or effort in his studies. Yet, here I saw him work with perseverance and take pride in the outcome.

This discrepancy in attitude towards classwork and homework was observed in several cases. Mike struggled with his classwork, due to his poor self-regulation skills, but made excellent progress on the trombone. The young man who clearly and thoughtfully explained his intentions and learning experiences before performing each passage in the video seemed worlds away from the immature, stubborn student I saw in class each week.

Instrument Karate: Findings

Generally, the video footage showed good quality performances, with occasional minor errors. Most students showed evidence of engagement and perseverance. Their presentation skills varied: some students were clear and confident, others did not engage with the camera at all and some of the less confident students even tried to hide their faces while performing, even though I had assured the students that I would be the only person who would view these recordings.

Research Cycle 2 Competency Profiles

The data I had collected throughout the first half of the second research cycle was collated using the same process as outlined on page 85 to form competency profiles for each

student. As I mentioned before (page 16) notions of objectivity and validity were of concern to me, so I built systems into my observations that allowed me to observe students in a fair and equitable way (more detail on this process is provided in Chapter 7). Given that my data was based on objective observations, a broad and deep knowledge of music, and many years of teaching experience, I assumed the positions that my competency profile maps were more accurate than those generated by the students' self-assessments, which were often linked to the students' emotional attachment to their own worth. The change to paper-based self-assessments (see page 98) meant that I had more comprehensive data to work with. While these self-assessments were more accurate that the ones produced in the first cycle, most students still overestimated their abilities. This skill was something I continued developing throughout the study and will discuss it further in Chapters 5 and 7. Figure 4.32 shows the competencies profile maps generated from my observations in orange and those generated from the students' self-assessment results in blue. These profiles will be analysed and compared with the profiles from the other cycles in Chapter 7.
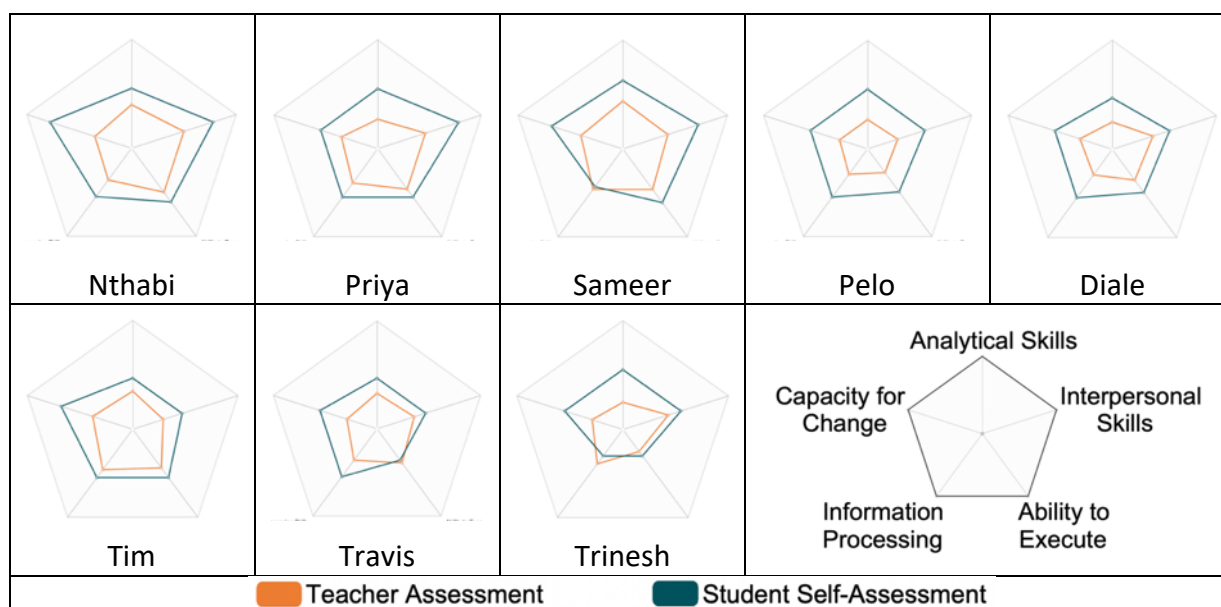
Figure 4.32: Cycle 2 (Design) Teacher and Student Assessment Competency Maps.

Research Cycle 2: Conclusion

Research Cycle 2 provided me with a number of valuable observations that pointed towards answers to the five research questions I presented in Chapter 1. The first research cycle had shown me that the students' interpersonal competencies had begun to develop through the work they were doing in the music class (page 88). I saw evidence of this again as the students readily shared their ideas and worked together when generating the competency definitions in Lesson 2. This competency area went through various ups and downs, as the students negotiated working with one another in a free and unstructured environment, but ultimately became stronger through this process. The creativity and curiosity I witnessed in Lesson 1, as well as the innovative instrument designs the students presented during Lessons 5, 6, and 7, also led me to conclude that the students' capacity for change competencies had improved during the course of this cycle.

These improvements were driven by the project-based nature of the activities conducted in this cycle. The PBL method ensured that students had ample opportunity to practice their interpersonal skills and the project brief demanded a certain level of creativity and innovation. I was also struck by the unexpectedly high levels of curiosity and critical thinking I witnessed in free play sessions.

Although the students, at times, found it uncomfortable to receive feedback from their peers, almost every student noted that they found this constructive criticism incredibly valuable, when objectively reflecting on their learning. This, along with the success of the paper-based self-assessment system (page 98) began to point towards possible answers for my third research question: "What type of feedback do the students and I find most effective?"

The paper-based self-assessments made a significant difference in this cycle. Not only did they allow me to capture more comprehensive data on the students' perceptions of their progress, but they became a valuable teaching tool too. After the students had gone through the process of defining each of the competencies in Lesson 2, I was able to refer to the self-assessment rubric, which was now readily available on a piece of paper (rather than online) and ask them which descriptor they felt would be most appropriate for their work in progress, and which descriptor they were aiming for. This then allowed the students to think about what they had to do in order to move from an 'emerging' or 'developing' rank to a 'proficient' or 'exemplary' one. The response to these types of conversations indicated that an explicit focus on 21CC was beginning to have a positive impact on the students' competency development.

As the case study was still in the relatively early stages, I was not yet able to see how skills developed through music specifically were used in other areas. I did note that the interpersonal skills developed during Cycle 1 were carried over into the instrument building project with relative ease.

The constructions phase of the instrument project that took place during Cycle 3 will be discussed in Chapter 5.

Chapter 5 – Research Cycle 3

Cycle 3 began after the April school holidays. This cycle contained a 5-week hiatus, caused by the midterm break, core examinations, and a school wide research project. Table 5.1 shows the dates and content of Cycle 3 lessons. This cycle can be seen in the context of the larger study in Table 2.10 on page 50.

Lesson 1	13 May 2019	Design Consolidation
Lesson 2	16 May 2019	Construction Lesson 1
Lesson 3	22 May 2019	Construction Lesson 2
Lesson 4	27 May 2019	Construction Lesson 3
Lesson 5	30 May 2019	Construction Lesson 4
Lesson 6	5 June 2019	Construction Lesson 5
Lesson 7	10 June 2019	Construction Lesson 6
Lesson 8	13 June 2019	Final Presentation 1
Lesson 9	19 June 2019	Final Presentation 2
Lesson 10	24 July 2019	Ensemble Lesson 1
Lesson 11	29 July 2019	Ensemble Lesson 2

Table 5.1: Cycle 3 Lessons

Instrument Karate: Orange Belt (Due on 13 May 2019)

Knowing that I would not see the students between the 3rd of April and 13th of May 2019 (school holidays and medical leave), I asked them to use this period to work on the next stage of their Instrument Karate, the Orange Belt.

Research Goals
• Is the student able to present themself in a confident and professional manner?
• To what extent has the student engaged with and applied the information presented in the flipped classroom material?
• Did the student show evidence of having worked through challenging aspects of the task?
• Could any indications that the student had considered and corrected their process be seen?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance	Information Literacy	Metacognition

Instrument Karate: Description

For the Orange Belt, students needed to perform five short pieces comprising the first five notes on their instrument using crotchets, minims and dotted minims, as shown in Figure

5.1. The students who had prior musical experience and set their own goals (page 58) submitted video evidence that they had achieved what they set out to do.

Figure 5.1: Trombone Orange Belt

Instrument Karate: Observations and Findings

I once again had the opportunity to observe a different side of the students. Pelo, who barely acknowledged me during lessons, presented her work with confidence and ease, greeting me by name at the beginning of the video, and listing each of the pieces she played on her saxophone. Kylesh, who in conjunction with his trumpet teacher had set the goal of learning to play 'Heathens' by Twenty-One Pilots, also showed unprecedented interpersonal skills in this setting. He had also clearly exercised his problem solving, perseverance and metacognitive competencies in mastering this challenging piece. I noted an overall improvement in confidence, with students who had shied away from the camera at Yellow Belt level displaying better self-presentation skills in the Orange Belt. Sameer and Tim's performances were confident and well-delivered. Tim used title cards at the beginning of each track to create a more professional looking video and Sameer attached

an orange ribbon to the end of his flute, to remind me that I was watching his Orange Belt video. Clearly, learning to play an instrument in their own time and at their own pace allowed the students to develop and exhibit 21CC in ways that they could not in the classroom setting.

Lessons 1 to 7: Instrument Construction (13, 16, 22, 27 & 30 May, 5 & 10 June)

Research Goals
• To what extent are analytical skills employed in the construction and coding of the instrument?
• Are the students able to work effectively in teams?
• How productively can the students work for an extended period of unstructured time?
• Are the students able to regulate their behavior and complete their tasks successfully?
• Do the students consider all of the information they have been provided with, when constructing their instrument?
• Are the students able to persevere through and use critical thought to solve technical problems?
• To what extent do students approach their tasks with creativity and curiosity?
• What affect does metacognition have on the instrument construction process?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving	Communication Collaboration	Initiative Self-Direction Productivity Perseverance Responsibility Self-Regulation	Information Literacy ICT Operations & Concepts	Creativity Innovation Flexibility Metacognition Curiosity

Lessons 1 to 7: Description

The first seven lessons of Cycle 3 were spent constructing the instruments designed during Cycle 2 and can be discussed collectively. The construction brought about a new level of chaos with students working with paint, glue, craft knives, and other arts and craft supplies to bring their designs to life. Each of the session began with the moving of furniture, because all painting had to take place on the balcony outside my classroom, and ended with my class looking like it had been hit by a tornado. During these sessions, I travelled from group to group asking questions and assisting with technical difficulties.

Lessons 1 to 7: Observations

Red Group

The Red Group split the labour between the boys and girls, with Jack and Mike working on the technical aspects, and Nthabi and Pelo working on the aesthetic elements. Pelo seemed thoroughly disinterested in the project and would use every possible opportunity to go to the school nurse or the bathroom. Even when she was present, she often sat staring into space or lying with her head on the desk. Both the coding and construction phase took much longer than it should have, with inordinate amounts of time wasted on unnecessary tasks. Jack and Mike spent two full lessons trying to transfer the Mp3s that they had downloaded from their iPads to the computer. They also decided to programme animations, which would not been seen, into each of their triggers. When I asked to see their coding at the beginning of the fifth session, they also admitted that they had not been saving their work and rather started afresh in each session. As I researcher, I found this lack of critical thinking interesting. As a teacher, I did not take this news well. Nthabi suffered with poor health throughout this phase of the project and missed two construction lessons, as well as the final presentation. Nevertheless, she made the most valuable contribution to the project by finding, printing and positioning the trigger images, painting the instrument, and connecting the Makey-Makey. The others floundered without her. Pelo was entirely unsure of what to do when she did not have Nthabi's instruction and I had to intervene, finding the pictures that Nthabi had printed in the group's folder, and telling her to cut these out. It took her a full lesson to cut out one image. Jack and I had this brief exchange:

> Teacher: Jack, why aren't you doing anything?
> Jack: We were thinking, well we were just trying to find out about, I guess we should test and see if it works but we're gonna, well I guess we should ask, it's like also a bit dependent on like on how they want to do it, a little bit.
> Teacher: Okay, but you guys need to talk to each other. Go and find out what Pelo is doing.

Pelo, Jack and Mike had to finish the instrument without Nthabi. They struggled. I came across Pelo painting a small piece of polystyrene which she claimed would be used to trigger the sounds. She stared blankly at me when I reminded her that Nthabi had already placed split pins in each of the images to act as triggers. The group connected some of the crocodile clips to the front of the instrument rather than to the backs of the pins, which were protruding into the inside of the box where the Makey-Makey was housed. I insisted

that the group rethink their ideas. They also decided to allow each trigger to play the full nursery rhyme rather than a single word, despite earlier concerns that had been raised during the design presentation about originality and copyright.

Blue Group

The Blue Group started by sitting down as a group and finalising their idea. They created a list of the sounds they wanted to trigger at each point of their cut-out shapes and divided the work between themselves. Nandi and Priya would take on the artwork and construction, Ethan would begin work on the coding and Dinka would source the other materials they needed, which included two metal rods to use as gear levers. I suggested that they create conductive rods out of the materials we had in the classroom, but Dinka was certain he would be able to find these items somewhere else. After about 45 minutes he returned, having been to various departments and finally to the groundkeeper, who had exactly what the group needed. Such initiative in approaching unfamiliar teachers and staff must have taken a level of confidence in communication that I had not seen from him before. Dinka joined Ethan, who was extremely enthusiastic about this project and loved experimenting with sound, to assist him with the coding. He managed to transform the default 'meow' sound into chirping crickets and his own voice saying 'hello' (which he recorded) into the sound of birds. He went around the class, inviting his classmates to come and see what he had created. As he became more and more excited, he seemed to drift away from the project and began creating sounds that did not match his group's intentions and then decided to create animations that accompanied each sound. Whilst this use of his time was 'off task', as these animations would not be seen as part of the final project, it was interesting to see how much he was able to learn and achieve, driven by nothing but his own curiosity. Dinka managed to get Ethan back on track and together they produced eight unique sounds by manipulating the pre-set sounds that Scratch offered.

Nandi and Priya started their construction with little planning and came looking for a craft knife before even sketching out their design on their box. I urged them to think before they cut and reminded them of the skills I was looking for by referring to the self-assessment rubric, and I urged them to look at their project with a more critical eye. Nandi, who had not shown much enthusiasm during research Cycles 1 or 2, seemed to take ownership of the project, once she and Priya had finalised the design and cut it into the box. She remarked on more than one occasion how much she was enjoying the project and how excited she

was. This translated into a substantial improvement in the quality of work: the artwork she and Priya created was meticulous and of a high quality. Assembling the instrument was challenging, as Priya and Nandi had glued the base board into the box before connecting the wires and Makey-Makey, but Priya and Nandi worked well as a team to complete the task. Once the coding had been completed and the Makey-Makey connected, the group decided that, even though the instrument was not working perfectly, with two of the triggers not working, they were finished. I once again used the self-assessment rubrics to deal with this situation, asking the student how they felt their decision to essentially give up would impact where they rated themselves on the ability to execute scale. This prompted them to revisit the troublesome areas and spend more time fixing the problems.

The Purple Group

The Purple Group got to work quickly, with Ben taking charge of the coding and Emma and Vuyo the design. Kevin seemed to float between Ben and the girls, uncertain of how to contribute. Ben had taken his design idea a step further and incorporated a function that allowed the player to switch between sections of the orchestra. He explained that these different modes would include full orchestra, strings only, woodwinds only, brass only, strings and woodwinds together, and woodwinds and brass together:

Teacher:	But how is this actually going to work. I don't think you can do this with the Makey-Makey.
Ben:	So basically, I will create a variable in the lowest down section of this coding box, so I'll create the variable and named it mode, but you can name it whatever you want. So what I'll do, is I'll make a loop of waiting 'till I press the key 'B', then it changes from mode 1 to mode 2 to mode 3, and on each character I've made, if it's mode 1 then, if I press 'A' it will make these three sounds, but if it's on the second mode, then it will make these three sounds and it keeps going.
Teacher:	Wow, that's fantastic. I didn't know you could do that.

Vuyo and Emma had decided on a galaxy theme for the box, with triggers incorporated into the design as stars. They invested several lessons in the careful mixing and layering of paint, producing a beautiful design. Emma transferred the logo she had designed onto the box, and I was pleased to see this level of initiative because in the past, she had shied away from any type of responsibility. Kevin was still at a loose-end, and I encouraged him to start liaising with his team to find out how many triggers they were creating and suggested that he begin connecting crocodile clips to the Makey-Makey. Ben's code was incredibly complex. He knew exactly what was going on, but it was taking longer than expected and Kevin, Emma and Vuyo needed to start inserting the triggers and connecting

the Makey-Makey to the box. A few moments later, when I returned to this group's workstation, I saw Ben removing the triggers his teammates had just inserted. He explained that his team had just randomly inserted several split pins, without any consideration of the configuration and that some of these split-pins were touching one another, so would trigger multiple sounds. Despite still having a lot of code to finish, Ben got out his ruler and carefully measured equidistant positions for each trigger while the rest of his group stood and watched. His need to control every aspect of the project, did lead to a fantastic end result that was far more complex and functional than any of the other instruments produced through this project. He did, however, also manage to alienate his teammates in the process, making them feel like everything they did was not quite good enough. Thus, Ben achieved exceptionally well in the analytical skills, ability to execute and capacity for change competency areas, but failed to pay attention to his interpersonal skills, highlighting how important it was to keep referring to the self-assessment rubrics.

With quite a bit of coding still needing to be completed in the final lesson, Ben had no choice but to relinquish some control. Emma and Vuyo connected the Makey-Makey, while Kevin constructed the mallets that would be used to play the instrument. Unfortunately, these students also decided to insert a whole lot of additional split-pins to look like stars. These 'stars' looked exactly like the triggers but did not produce any sounds, which made the instrument confusing to play. Ben was horrified by this development, but did not have time to fix it.

Orange Group

The Orange Group's design phase had been rife with conflict and I urged the group to improve their interpersonal relations. Tim heeded my request to treat the experience as an opportunity to learn how to deal with challenging personalities (Sameer and Mia) and ensure that his voice was heard, and I did observe an improved willingness to stand up for himself. Josh, on the other hand, used the conflict as an excuse for not contributing. I found him distracting members of other groups on numerous occasions and eventually insisted that he not leave his group's workstation. He sat, sulkily, playing on his cell phone. This irked his teammates and I witnessed this exchange at the beginning of one lesson when Josh was absent:

Mia:	Yes! Josh is absent
Sameer:	Yes!
	[Mia and Sameer high-five each other]
Tim:	You guys are so mean.

Mia took charge of coding the instrument, while Sameer constructed and painted it. Tim became a sounding board, talking through the process and asking questions that provoked better decision making. When Sameer was cutting the box, for example, Tim asked him to explain why he was making the cuts in certain places. This made Sameer reconsider and place the cuts more appropriately. At first I thought Tim was simply trying to find his way back into the project he had essentially been excluded from during the design phase, but soon realised that his questions were constructed to make Sameer think through his ideas before acting. Had Tim tried to 'correct' Sameer and tell him what to do, I have no doubt that Sameer would have retorted with some biting comment and gone ahead with his original idea. I was struck by the way Tim delivered his critiques so that they would be acknowledged. Sameer now seemed to enjoy explaining his ideas to Tim and began treating him with more empathy and respect.

Mia was unable to find appropriate sounds in the pre-set sound library offered by Scratch and decided to record live sounds for the instrument. Sameer was still hung up on the idea of creating a flute like instrument out of the flute box, so offered to play the sounds while Mia recorded them. In an attempt to get them to try something more innovative I suggested they blend the sounds of the instrument each group member played (flute, trumpet and two clarinets) to create a new sound, but Sameer insisted on using a purely flute timbre. Tim took over the coding from Mia and quickly finished it. He understood how it would be wired and organised and colour-coded his code, so that they knew which wire to connect to which trigger. Connecting the Makey-Makey to the instrument was challenging, as the wiring had to be fed through small incisions in the side, but Tim, Mia and Sameer worked well together to ensure that there was no exposed wiring – a relief, after the strife they had experienced at the beginning of the project.

Yellow Group

Because the Yellow Group had got off to a shaky start during the design phase, with Lesedi being the only real contributing member of the group, I urged the other three to take ownership of the project. Only Travis took up this challenge. Lesedi, anticipating that she would be left in the lurch by her group again, had done a fair amount of work on the project before the first construction lesson. She had typed and printed an introduction and set of instructions that explained how to read music notation, written out the melody of 'twinkle, twinkle little star' to be included on the piano page with counting and note names written in to "help a beginner learn to play". Lesedi had also reconsidered her idea of incorporating non-traditional soundscapes in the book, abandoning them and focusing

instead on piano and drum kit pages. Travis distanced himself from Kylesh and Paul's antics, focussing on the technical aspects of the book and showing greater levels of self-regulation and initiative. Despite technical issues with a faulty charging cable, Travis was the first student to finish coding his group's instrument, and regularly liaised with Lesedi to ensure that he had provided sounds for each of the aspects she was designing.

There was clearly still a lack of forethought on how the Makey-Makey would be incorporated into the book, however, and I urged the whole team to get together and think through how this could work. I returned to their workstation later to find Paul playing on his cell phone and Kylesh staring into space. "Lesedi hasn't told us what to do yet", they said. I gave these boys the task of creating the drumkit page, telling them exactly how to do this, but they used this as an excuse to play the drumkit in my classroom, randomly bashing various drums. They were 'doing research', they said. I eventually found and printed a drumkit for the group and Lesedi wrote out instructions as well as sheet music for the page. I had not wanted to dictate how the students should conduct themselves or finish their tasks, because I felt that it would be harmful to the research. But in this situation, I felt a responsibility as a teacher to try and get Kylesh and Paul engaged in the project in the hope that they would develop one or more of their competencies in some way. It was interesting to me that, if they are unable to self-regulate their attention, this impacted on so many other areas.

It was not until the very end of the construction phase that Paul and Kylesh got involved. They helped Travis with the innovative way of building the Makey-Makey into the cover of the book: he instructed Kylesh to strip the wires he needed and Paul to hold various elements together as the glue between them dried. So Kylesh and Paul were ultimately able to make a valuable contribution through Travis's management of them. In Cycle 1, Travis had a quite underdeveloped competency profile and so it was interesting to see the improvement he was making in each of the broad competency areas. I wondered if he would have achieved this had he been in a group that more readily shared the responsibility of the project with him.

Green Group

The Green Group had settled on a design that would bring awareness to the amount of plastic in the world's oceans and the damage this was causing. They planned to construct fish out of plastic and have them trigger ocean-themed sounds, but they lost sight of this plan and created an instrument that did not live up the potential of their design. There was

a distinct lack of forethought in this group. All three members spent most of the first construction session watching an online origami tutorial and collaborating on the construction of a single fish, made out of paper:

Teacher: Okay, that looks good, but you're making it out of paper, I thought the whole idea was that you were going to make it out of plastic… because of your conservation idea
Kate: Oh ja… the trash idea
Trinesh: Maybe we can just make our sounds out of plastic

In the end, the sounds were simply downloaded from the Internet and the entire justification for the instrument was lost. Kate continued with the origami figures, which took five of the seven construction sessions. This took way longer than necessary and was interspersed with conflict within the group, as well as socialising with classmates. Kate had shown enormous potential in the first research cycle, but seemed disinterested in stretching herself further and struggled to maintain momentum. Trinesh and Diale worked in tandem, sourcing various sounds, coding the instrument, and wiring the Makey-Makey. When I asked probing questions about how the instrument would trigger sound, Trinesh was adamant that they would squeeze the fish to do so, despite the fact that the Makey-Makey triggered sound through the closing of an electrical circuit, not pressure, and that fish constructed out of paper would crumple when squeezed. Trinesh kept assuring me that he knew what he was doing, but I eventually insisted on a demonstration:

Teacher: I'm getting nervous about this squeezing situation. Please will you rig it up and show me how it works.
Trinesh: Now we've decided that we're actually just going to stamp it with our foot.
Diale: The earth
Teacher: But I thought this thing was going to hang from the ceiling.
Trinesh: Yes, but we'll attach it.
Teacher: Okay, but have you spoken to Kate about this because she's outside painting a handle. I think we need a group huddle to make sure we're all on the same page.

This indecision and disorganisation were of great interest to me, given the impressive level of 21CC development these three students had exhibited in Cycle 1. I found it particularly noteworthy that, in the fifth construction session, Diale and Trinesh had not yet set up a Scratch account, but were restarting their coding in each session. Eventually the group completed their instrument, which now included a growling Loch Ness Monster. It did function, but it failed to fulfil the potential I had observed in its design.

Lessons 1 to 7: Findings

A great deal of 21CC development was observed during the seven lessons it took the students to build their instruments, with a number of students learning fairly difficult lessons along the way. A distinct lack of planning and critical thinking from most students, who rushed into cutting and sticking before even considering what they were making, led to more careful mapping out of what they needed to do as they tried connecting the instrument to the Makey-Makey. The complexity of these tasks compared to what they had done before demanded more critical thinking and planning, especially concerning how the instrument would *sound*. These technical challenges also necessitated a growth in problem solving skills. Students grappled with poor communication and collaboration which resulted in misunderstandings and mistakes, but the more they communicated with one another, the more their individual contributions complemented one another's. I noted that, over the course of these seven lessons, students became more adept at managing challenging social situations. Some students still did not take responsibility for the team effort, while others showed significant growth in this area. In some cases – and these two things were related – students took responsibility, because no one else in their group would. Self-regulations continued to be an area of weakness for almost all students. The seemingly unstructured nature of the lessons meant that students were entirely responsible for their behaviour and struggled to remain focussed. It appeared that students were so used to having a teacher tell them what to do, that they struggled to manage their time and focus independently. But even in this competency area I did note a slight improvement during the seven lessons.

At the beginning of the construction phase I was, once again, struck by the lack of ICT competencies, among students who has used tech devices since childhood: forgotten passwords, mismanaged accounts, and the inability to solve technical challenges. These markers had to improve during the project, however, and perhaps because technology became, for the first time, a vehicle through which to express creativity rather than to use passively, they did. A number of students eventually created extremely interesting and innovative sounds and triggering methods. The curiosity I observed in most students was a driving factor in their acquisition of this and other competencies. Those who were most ready and willing to change explored different avenues and options, reflected on and learnt from their errors and showed the greatest improvement in each of the competency areas during these lessons.

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Lessons 8 and 9: Presentation of the instruments built (13 and 19 June)

Research Goals				
Presenting Students: • Are the students able to explain how their instrument works and why they made the design and construction choices they did in a critical way? • Are students able to reflect on the process of building the instrument, the challenges they faced, and the growth it took to overcome these challenges? Observing Students: • Are the students able to provide critical and well thought-through feedback? • Are students able to regulate their behaviour and focus on the presentations?				
Analytical Skills	**Interpersonal Skills**	**Ability to Execute**	**Information Processing**	**Capacity for Change**
Reasoning & Argumentation	Communication Self-Presentation	Responsibility Self-Regulation	Information Literacy ICT Operations & Concepts	Curiosity Metacognition

Lessons 8 and 9: Description

The students presented their completed instrument to their classmates on the 13th and 19th of June. As this was the beginning of winter, a number of students were absent due to ill health and so three of the six groups were short of one member. Each group was asked to demonstrate how their instrument worked, comment on the challenges they had encountered and explain how they had overcome them. After this, the class asked questions, and I encouraged critical, well-presented feedback.

Lessons 8 and 9: Observations

Red Group

Nthabi was absent during her group's presentation and the remaining three members each took a turn to explain their group's instrument. The student audience was quick to question whether the object that the Red Group had created could be considered an instrument, to which Pelo responded, "It's basically just like… something for kids to dance to… young kids… so it's not really an instrument" (Class Observation Footage 13 June 2019). The presentation disintegrated into chaos as Mike responded to further questions about originality, copyright infringement, and triggering logistics, by shouting "but it can do *this*!" and triggering all four songs simultaneously. As a researcher, I was once again struck by the marked discrepancy between the way Mike conducted himself when alone (in his karate videos) and when in front of his classmates.

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Figure 5.2: Red Group's Instrument: 'The Waiyakaphone'

Blue Group

Nandi and Priya presented the Blue Group's instrument, while Ethan and Dinka demonstrated how it worked. As in their design phase (page 105), they struggled to fully articulate the rationale behind their choices, and so the class struggled to grasp how this object would function as an instrument. Nthabi asked, "How is yours… I don't know how to say this without sounding mean… but is yours supposed to be an instrument? Like… where is it going to be played?" (Class Observation Footage 13 June 2019). The class was, however, impressed to learn that all of the unique sounds the instrument made had been constructed by manipulating Scratch's pre-set sounds. Ethan took great joy in this recognition.

Figure 5.3: Blue Group's Instrument: 'Soundscape'

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Purple Group

This Group had produced the most successful instrument and took great pride in demonstrating it to the class. There were few questions. Emma was absent, but Ben, Vuyo and Kevin explained clearly how it worked, and justified each of their decisions with a well-thought-out explanation.

Figure 5.4: Purple Group's Instrument: 'The Band Box'

Orange Group

Sameer, surprisingly took a step back in the Orange Group's presentation, allowing Mia to present the instrument and Josh to demonstrate it. Josh played 'Mary Had a Little Lamb', which Mia had written out and taught him. He faltered towards the end and Sameer, rather than berating him, began gesturing which note should be played next. When reflecting on this afterwards, Sameer noted:

Sameer:	We did have some conflict in our group for a short period of time
Josh:	[laughs]
Sameer:	We did resolve it, it's fixed now. I think as a group we did work effectively and collectively. But making this instrument as a group wasn't easy… I'm not going to say who [Josh points at himself], but it wasn't really easy getting everyone to focus on what we needed to do…
Mia:	to focus on the task…
Sameer:	But I do give credit to all of our group members, because it was a group effort and we all did do something in the end.

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Figure 5.5: Orange Group's Instruments: 'The Wearable Electroflute'

Yellow Group

Kylesh was absent for his team's presentation, but Lesedi, Travis and Paul provided a detailed explanation of how their instrument worked. Despite the trouble this group had experienced throughout the design and construction phases (see pages 118 and 142), they were able to give a well thought out presentation and demonstration.

Figure 5.6: Yellow Group's Instrument: 'Play as You Go'

Green Group

Having witnessed previous questions about the function of other groups' instruments, Kate, drawing on her orchestral experience, started the Green Group's presentation by explaining that their instrument was an 'effects' instrument, akin to the vibraslap or chimes. Trinesh then took over the presentation reminding the class of the ocean awareness concept they had presented during the design phase presentation (page 128). When questioned about the execution of their concept, with students noting that the instrument included a Loch Ness monster and no plastic, Trinesh reluctantly admitted that the group had lost sight of their original idea. Their demonstration was fraught with technical difficulties and I eventually had to step in to assist, so that the class could hear the instrument in action before the end of the lesson.
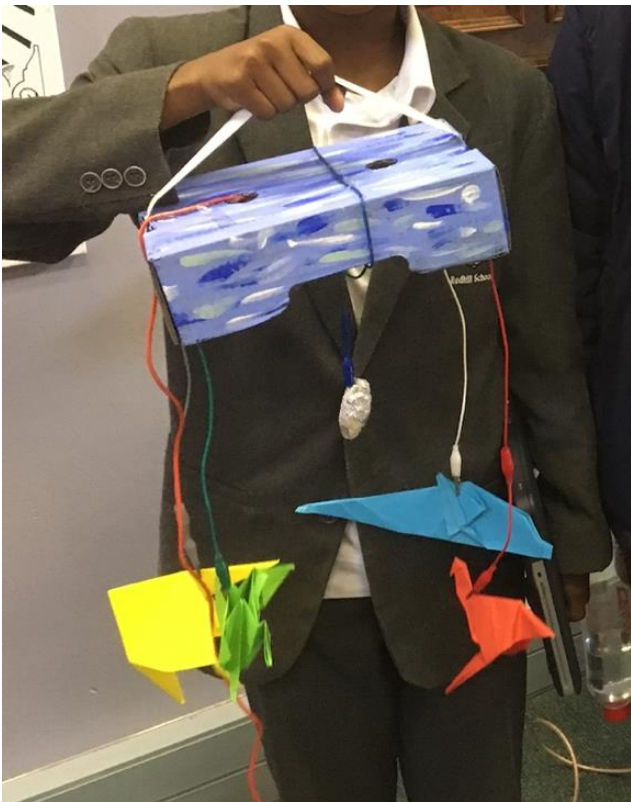
Figure 5.7: Green Group's Instrument: 'Fishy Water 3000'

Lessons 8 and 9: Findings

The instrument presentations allowed me to observe the end point of the students' growth during this project, and I was struck by how significantly a number of students' competencies had developed. There were still some 'outliers' but I noted general improvement in each of the broad competency areas in most students. It remained to be

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seen how this compared to their progress through the karate belts, on individual instruments.

Instrument Karate: Green Belt (Due on 19 June 2019)

Research Goals
• Is the student able to present themself in a confident and professional manner?   • To what extent has the student engaged with and applied the information presented in the flipped classroom material?   • Did the student show evidence of having worked through challenging aspects of the task?   • Could any indications that the student had considered and corrected their process be seen?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance	Information Literacy	Metacognition

Instrument Karate: Description

In order the receive their Green Belt, the students had to incorporate the flattened third (of the scale they were beginning to learn) as well as quaver note values into their repertoire. The addition of this new note allowed us to begin a practical exploration of the musical element of tonality. Figure 5.8 shows the Green Belt chapter form the Flute Karate Book.

Instrument Karate: Observations and findings

The inclusion of quavers into the Green Belt pieces' rhythms proved challenging for a number of students. Most students could play the rhythms correctly although the pulse of the music began to fluctuate, resulting in stilted performances. More than in any of the other belts, I noted that students were skipping through errors, here, rather than correcting themselves. Nandi, for example, played her first two pieces successfully, but struggled with sound production on the third and became flustered. Rather than assessing what was going wrong and adjusting her embouchure, she continued playing, ignoring the squeaks and non-sounding notes. I attributed this slight decline in metacognitive competencies to the fact that this project was submitted just before these students had their first school examination experience.

Figure 5.8: Green Belt Chapter – Flute Karate Book

Lessons 10 and 11: Ensemble Performance (24 and 29 July 2019)

Research Goals
- Are the students able to regulate their behaviour while working in an ensemble setting?   - To what extent are the students able to assess their own actions, adjust, and problem solve in order to produce the desired outcome?   - Are the students able to produce an improvised performance from the theoretical information provided?   - To what extent do the students persevere, as the tasks become more challenging?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance Responsibility Self-Regulation	Information Literacy	Metacognition

Lessons 10 and 11: Description

The final two lessons of Research Cycle 3 were separated from the lessons that came before them, by the June Examination Session, and from the lessons that came after them, by the August School Holidays. The Middle School Students wrote examinations in

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their core subjects (English, Afrikaans/isiZulu, Maths and Science), but did not write a music exam. I used these two lessons, on 24 and 29 July, as an opportunity to start ensemble practical work. By this stage, students had submitted their white, yellow, orange, and green karate belts, which meant that they were familiar with the first five notes on their instruments and could read rhythms in crotchets, quavers, minims, dotted minims and semibreves. Some had gone further, submitting video recordings that earned them blue, purple and brown belts too. The class also contained 10 students who had completed graded music examinations between Grade one and eight, and Priya, Mia, Kate and Lesedi were members of the school orchestra and experienced ensemble players. I decided to cater for this very large range of instrumental abilities by allowing students to improvise in their first ensemble lesson, using the two lessons to explore the ideas of tonality, melody, harmony, texture, and structure (that they had encountered theoretically) in the practical sphere. I started the first ensemble class by asking every student to play the note 'C' on their instrument. As the class contained clarinets, trumpets, alto saxophones, and a French horn in addition to several concert pitch instruments, this did not produce the single note many students expected. After a brief explanation of transposing instruments, I divided the white board into three sections: 'Concert Pitch', 'B Flat', and 'E Flat', and asked Lesedi to work out the French horn transpositions on her own, to give her a challenge.

After recalling the definitions of melody, harmony and texture, I asked the class to play a simple melody over and over again, adding one more player each time. I started with the more experienced players, so that the less experienced players could hear the melody several times before they joined in. We discussed how the succession of notes I had written on the board formed a melody, and how the texture of our piece became denser, as we had added more instruments. I also introduced the term 'monophonic'. Then I explained that we would be exploring harmony and introduced the students to the basics of triads and how they were written in staff notation. We moved from there to creating a chord progression using the notes of the tonic, subdominant, and dominant triads in C Major for the concert pitch instruments, and the appropriate transpositions for the other instruments. Once the class had constructed their triads, they performed a I-IV-V-I progression, with each chord lasting for a semibreve. In the final exercise of this class, the students played a twelve-bar blues progression as a group. Again, each chord was held for a semibreve and I encouraged the more advanced students to improvise using the notes of the triad.

The second ensemble class built upon these musical ideas, with students exploring the idea of tonality by constructing minor triads; the idea of homophonic and polyphonic textures by playing long sustained notes or by improvising melodies using the notes of the triads; and the idea of musical structure by assigning different parts of the performance to different groups of instruments.

Lessons 10 and 11: Observations and findings

The students were exceptionally excited at playing their instruments together and required constant reminders to regulate their behaviour, but I was pleased at the analytical skills and metacognition I observed, with only a few students showing deficits in this area. Some of the more musically experienced students, particularly Kate and Trinesh, had not exhibited the competencies I knew they possessed during the construction phase of the instrument project, but I was pleased to observe that in the ensemble setting, these students displayed 'exemplary' skills in each of the broad competency areas.

Research Cycle 3 Competency Profiles

In drawing up the competency profiles seen in Figure 5.9 – which will be compared to those from other phases of research in Chapter 7 – I took into account my observations from the six sessions of the instrument construction, the final instrument presentations, the orange and green instrumental karate belts, and the two ensemble lessons. Now that the students had become more used to assessing themselves and their analytical skills had begun to develop, their self-assessments (shown in dark turquoise) more closely resembled my own (light green). In most cases, too, the more developed the student's competency profile, the more it matched with mine – an experienced teacher. I saw this, in itself, as evidence that the students' competencies were growing and developing. Students noted that they found the self-assessment process challenging, but they began to see the benefits of this:

Teacher:	How have you found the process of assessing yourselves?
Dinka:	I think it's helpful to see that like… if you didn't do work, then you can see like, oh I didn't do work this time. Next time I can do more work.
Nthabi:	I agree with Dinka. So you give us a rubric so we can assess ourselves, then you put it in a folder. Then next time, when you get the rubric, I look at the other rubrics and I assess myself before looking at the other rubric and I see how I improved or how I have not improved

and where I'm still the same… and what in the next lesson should I try and improve on myself, because some people just judge themselves differently and I'm very hard on myself so I do feel that for me to move spaces I need to really push myself.

Ben: I personally quite like assessing myself, but I also like it when the teacher assesses me because I often find that I may be either too hard or too soft on myself and I'm not really sure at times which one (Term 2 Focus Group, 1 August 2019).
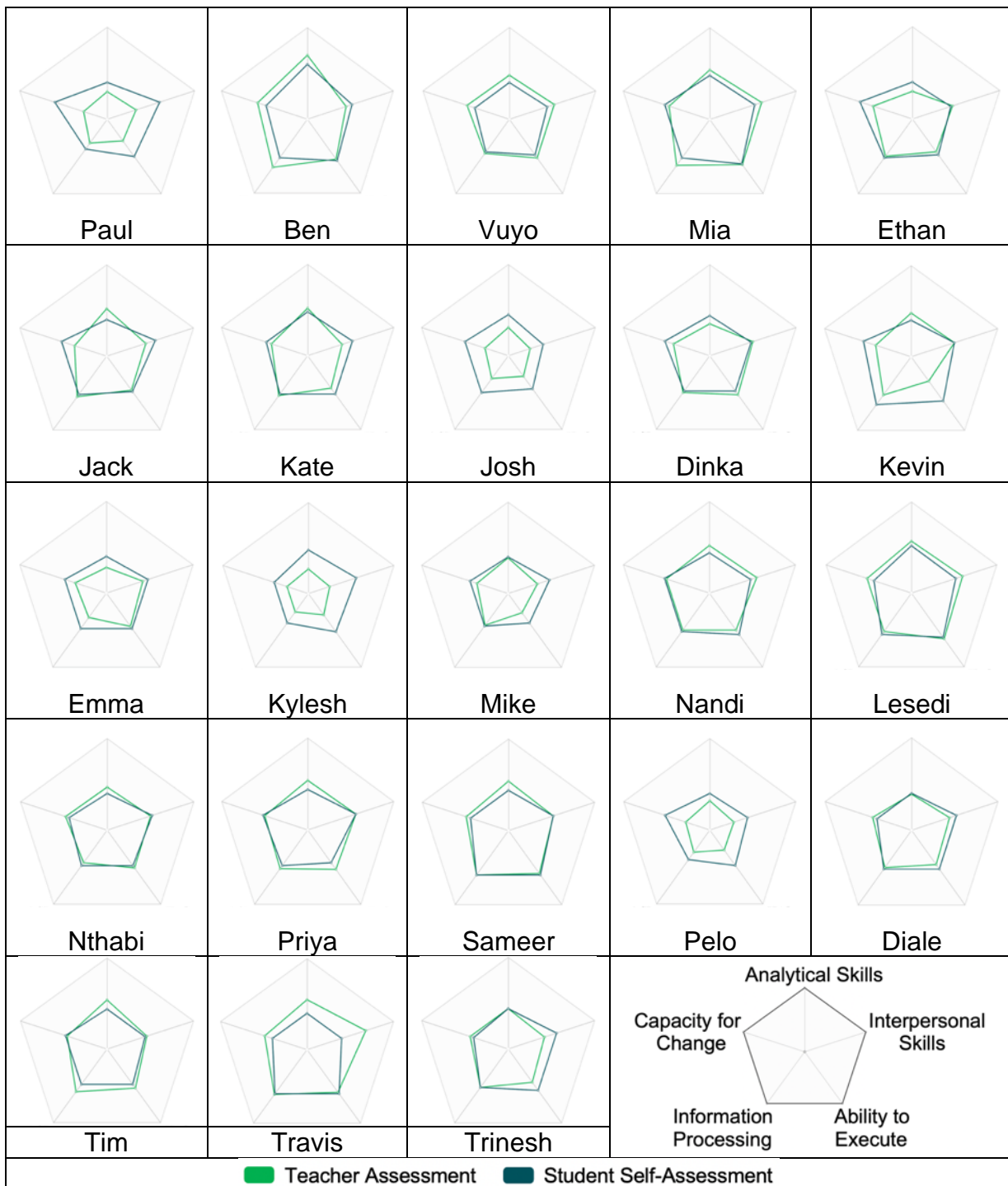

Figure 5.9: Cycle 3 Teacher and Student Self-Assessment Competency Profiles

Research Cycle 3: Conclusion

The data collected Cycle 3 reaffirmed the Cycle 2 findings (page 133). In addition, I began to note improvements in all five broad competency areas, the most significant being in interpersonal skills and capacity for change. The seven lessons dedicated to completing one complex task, a well-defined project that allowed for open ended, self-guided solutions, had been a very challenging process for the students, which is (I think) why most of them demonstrated significant 21CC growth during this period. The exercise also reaffirmed, for me, that PBL was an effective method in which to develop these competencies. I further noted that the act of learning to play a musical instrument, and working through this at home without undue pressure – the flipped classroom method – allowed the students to demonstrate more evolved 21CC.

They seemed to have found the process of receiving peer-based feedback in the first phase of the project rewarding, overall. The presentations and feedback session at the end of the project, however, were less successful. Students did not respond to each other's feedback favourably when they had a complete product, rather than a work in progress as, at this point, they could not incorporate this feedback into their product. Yet, they continued to find the rubric-based feedback valuable in developing their competencies and their instrumental skills. I argue strongly here that this deliberate focus on, and discussion of, the 21CC aided the students in understanding how their actions would help or hinder them in the process of this project. Creating conditions for 'in-built' and overt metacognition and self-reflection appeared essential for the benefits of competency development to be reaped.

The transferability of 21CC was also something that started to reveal itself towards the end of the second cycle. When asked whether they felt that any of the competencies they had been developed in music had been helpful in other subjects, Mike noted:

> In English I've got much better at communicating with people. And in Afrikaans dialogues, it's much easier to get my opinion across (Term 2 Focus Group, 1 August 2019).

This was, all in all, a promising end to a very difficult Cycle, a fact that boded well for Cycle 4.

Chapter 6 – Research Cycle 4 and Final Assessments

By the end of Research Cycles 1, 2, and 3, the students had explored 11 of the 14 elements of music (pitch, rhythm, meter, tempo, instrumentation, timbre, melody, harmony, tonality, texture, and structure) through various practical, project-based and game-based activities. The final three elements (dynamics, articulation and character) were the main focus of the Instrument Karate's Blue Belt activities, which were assessed in the first lesson of the third cycle. By the end of Lesson 1 of Cycle 4 the students had investigated each of the 14 elements of music. The rest of the Cycle was used to provide students with the opportunity to develop the tools and vocabulary relating to this knowledge in order to more easily think about, speak about, and appreciate music.

A reminder at this point about using 'music' in the development of 21CC: as can be seen, the 'class music' of this project was not 'singing', indeed, it involved almost no singing as a class, although students did use their individual voices while demonstrating and experimenting. Far more important than developing their vocal or even instrumental ability, they were developing their outer and especially *inner* ears, all the time, through learning the elements and how they were notated, through the instrument karate belts, through all lessons in which they had to consider 'sound', and especially through Cycle 4's class project and group ensembles, as I now explain. This cycle consisted of nine lessons which are laid out in Table 6.1 below:

Lesson 1	4 September 2019	Instrument Karate – Blue Belt Check-In
Lesson 2	9 September 2019	Elements of Music Overview
Lesson 3	12 September 2019	Sample Match Exercise
Lesson 4	18 September 2019	Court Case Preparation
Lesson 5	23 September 2019	Court Case Arguments 1
Lesson 6	26 September 2019	Court Case Arguments 2
Lesson 7	10 October 2019	Court Case Arguments 3
Lesson 8	21 October 2019	Ensemble Lesson 3
Lesson 9	30 October 2019	Ensemble Lesson 4

Table 6.1: Cycle 4 Lessons

At the end of Cycle 4, in order to satisfy the school's reporting expectations, the students were required to complete a class test and an examination. These formal assessments, held on 4 and 28 November 2019, will be discussed in detail at the end of this chapter. Here, I deal with Lesson 1 of Cycle 4, followed by Lessons 2-3, 4-7 and 8-9. This chapter therefore has four sections and ends with a summary of this final research cycle.

Lesson 1: Instrument Karate – Blue Belt Check-In (4 September 2019)

Research Goals
• Is the student able to present themself in a confident and professional manner?
• To what extent has the student engaged with and applied the information presented in the flipped classroom material?
• Did the student show evidence of having worked through challenging aspects of the task?
• Could any indications that the student had considered and corrected their process be seen?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance	Information Literacy	Metacognition

Lesson 1: Description, observations and findings

The first lesson of the term was used to discuss three things: the students' experience of completing the Blue Belt assignments during the August holidays, consolidating their practical understanding of dynamics and articulation, and discussing the element of 'character'. In the Blue Belt video presentations three short pieces were required (see the Saxophone example in Figure 6.1), which used all of the pitches and rhythms that the students had learnt so far, plus dynamic and articulation markings. As before, each student could access a video, which explained and demonstrated how to play their instrument at various dynamic levels and how to produce different articulations, such as staccato, legato and accents. Varying the dynamics on wind and brass instruments often results in a change of pitch as well, so maintaining a steady pitch is a careful balancing act that requires a great deal of trial and error, as well as a continual and meticulous reflection on one's actions, their outcomes, and the adjustments needed. The Blue Belt videos thus offered one of the most significant insights into the students' competencies of perseverance, problem solving and metacognition in the study.

However, this lesson was the first time I had seen the students in a month and many of them had travelled during the school holidays, and so were excited to share their news with me. I was more anxious to hear the students' reflections on the process of completing the Blue Belt assignment, but these class conversations further cultivated the warm relationship we had, the class and I, contributing in no small way to the work we had to do together. Instead of hearing stories of struggle and growth through music, then, I learnt of video game levels beaten, skateboard tricks learnt, and cousins visited. The connections that all this sharing established were instrumental not only to the learning process, but also

to the research process, affirming the level of trust we needed, so that students could willingly offer feedback in our focus groups.

Figure 6.1: Saxophone Blue Belt

Some students had clearly struggled with the Blue Belt tasks and had not been able to master their three pieces. When reviewing the self-assessment these students submitted, I noted that some, like Paul (Figure 6.2), had indicated that their poor performance was a result of lack of perseverance, while others, like Diale (Figure 6.3), felt that this was caused by their inability to work out what was going wrong. Sameer had clearly persevered through these challenges and was able to play each of the three Blue Belt pieces with only minor errors. His sound cracked a few times as he attempted the louder passages in his pieces, but I observed him adjust his embouchure and role his flute outwards slightly to counteract this. These minor adjustments were evidence that he had spent time practicing and problem solving, both of which require self-reflection, regulating one's own dispositions (such as frustration and perseverance) and metacognitive awareness of the task. This evidence was also seen in the videos submitted by Ben, Tim, Mike, Nthabi and Pelo.

Figure 6.2: Paul Blue Belt Self-Assessment

Figure 6.3: Diale Blue Belt Self-Assessment

Six of the ten students taking lessons with a private teacher, and who had set their own goals for each belt, were approaching the external graded music exam sessions (September/October) they were preparing for.[10] They each submitted recorded performances of a high quality that demonstrated either 'proficient' or 'exemplary' competencies.

My main finding for this lesson was that when beginning to learn an instrument and when asked to play pitches, rhythms, dynamics, and articulation markings, the complexity of the on-going musical effort was highly effective in developing competencies in each of the five broad competency groups. For example: the students had to interpret the signs and symbols of staff notation and associate them with hand and mouth positions; they had to consider what physical adjustments were needed in order to play each note loudly or softly and consider *how* loud or soft it should be; and they had to interpret other symbols that explained how each note should be played in relation to the other notes around it. Each note had to be held for a specific amount of time, and all of these tasks needed to be done simultaneously, in time with a beat – and all this in the moment, for in music, time does not

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[10] Ben and Nthabi were also preparing for music exams on their principal instruments, but had not submitted videos of this work, as they were learning to play euphonium and saxophone, respectively, in class.

wait. The complexity of this task required multiple competencies to work together and it was interesting to find that a weakness in one of the five competency areas resulted in an unsuccessful performance. Even the students who had already shown a degree of success in music performance (through their participation in external graded exams) demonstrated more developed competency profiles in the practical examination work they presented.

Cycle 3 Project

In Cycle 3, I used a project-based approach to teaching and learning, once again. The aim in this cycle was to apply the students' new grasp of the elements and their vocabulary to a new project that was to demonstrate their ability to listen to, think about, and discuss music in a critical manner. During the Cycle 2 and 3 presentations I had noticed that my students enjoyed engaging with one another and were not afraid to disagree or point out flaws in their classmates' arguments. Inspired by this, I decided to run a kind of 'moot court', where students could simulate acting as prosecution and defence lawyers in recent, real-life (documented) music copyright cases. I selected five such cases of alleged music copyright infringement drawn from The George Washington University Law School & Columbia Law School's website, (Music Copyright Infringement Resource 2018). Then, I assigned groups of students to represent or oppose the 'clients' (composers) in each case. Their job was to find music-based evidence of illegal borrowing of someone else's song, or to disprove such borrowing, by comparing and contrasting the various elements of music in both the songs involved in the case. Finally, they were required to construct an argument for or against the charge of copyright infringement. Before allowing them to research the task, I needed to revise the elements of music (because of the month break), then divide the students into groups, again, but in different configurations (to give them a chance to further develop their collaboration and communication skills) this time.

Cycle 3 Groups

During the instruments project in Cycle 2, I mixed students' competency profiles, based on evidence from the end of Cycle 1 (see page 94). In the court case project, I did the opposite, constructing groups of students who shared similar profiles. I did this mainly so that the 'lawyers' arguing against each other would be more equally matched, which I hoped would provide the students with a greater challenge and thus a greater learning

opportunity. Figure 6.4 shows these new groups together with their competency profiles from the end of Cycle 3. The 'defence teams' (claiming that their client did *not* copy a song) are indicated in shades of green, while the prosecution teams (claiming that their client's song *was* copied) are shown in shades of purple. The groups' 'clients' are also indicated in this table.

Figure 6.4: Cycle 3 Competency Charts of Court Case Project Group Members

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[11] This is the correct spelling of the artist The Weeknd's name.

Lessons 2 and 3: Revising the elements in preparation for the court cases (9 and 12 September 2019)

Research Goals
- To what extent can students demonstrate conceptual understanding?   - To what extent have the students' critical listening skills improved?   - Are students able to work effectively in groups?   - To what extent can students control their own behaviour in order to complete a task in an allotted time?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Interpretation	Collaboration Communication	Productivity Responsibility Self-Regulation	Information Literacy	Curiosity

Lessons 2 and 3: Description, observations and findings

In order to consolidate all the information on musical elements learnt so far, I returned to the mind maps students created early in Cycle 1 (see Figure 3.13 on page 68), and asked them to add as much information as possible to their maps, in order to for us to see what they had learnt since February. The experience of investigating these elements practically had clearly helped them, for they were able to expand on definitions and add descriptive words to each element. The class as a whole created a 'master list' that included everyone's input, on the white board (Figure 6.5), which remained visible throughout the following exercise as well as their court case preparation.

Figure 6.5: Students create a master list of the elements of music by sharing their groups' definitions and examples.

The second preparatory exercise was a listening task, designed to prepare students for the type of critical listening they would need to do in the copyright project and to allow me to observe how their critical skills (in applying musical knowledge) had developed. I selected 10 popular songs that I knew they were familiar with, and extracted snippets of the older songs that these new songs had sampled. I labelled these snippets A to J and students had to match the samples to the popular songs using the worksheet seen in Figure 6.6. They were also expected to note which elements within the songs were similar or different.

GROUP: ▮▮▮▮▮▮

POPULAR SONG	SAMPLE	SIMILARITIES	DIFFERENCES
Beyonce Crazy in Love	F	Emotion Tonality	Tempo Timbre Structure Instrumentation Pitch
One Direction Midnight Memories	J	Tempo Structures Emotions chord progression	Timbre Lyrics Genre
Christina Aguilera Ain't No Other Man	A G	No voice instruments (brass)	Voice Tempo
Ed Sheeran Shape of You	A	Emotion time signature beat	Lyrics melody
T.I. & Rhianna Live Your Life	E		
Nicki Minaj Anaconda	D	Lyrics a bit beat	tempo timbre
Drake Hotline Bling	C	Background rhythm	Lyrics instruments
Camila Cabelo Crying in the Club	I	Backup singers	
Sam Smith Stay With Me	B	chord Progression tonality	Instrumentation Tempo tom timbre character
Taylor Swift Look What You Made Me Do	H		

Figure 6.6: Sample Match Worksheet

During Lesson 2, I could not help but observe a change since Lesson 5 of Cycle 1 (page 66), as the students re-encountered their earlier mind maps. Along with the usual excited chatter, I noted improved self-regulation skills, as the students worked more productively and with a greater sense of purpose. As I walked around listening to their conversations, I noticed that they were drawing on their practical experience to generate definitions. Diale, for example, suddenly exclaimed "but the blues… we did harmony then… we played those different notes to make those… things", obviously referring to the triads we had explored during our ensemble lessons. After some conversation with the rest of his group they were able to remember the word 'triads' and note that harmony was 'different notes played at

the same time'. Only once they had gone through the practical process of creating harmony did they really understand the concept, 'harmony'.

Understanding was one thing, applying it another. In Lesson 3, every group was able to correctly match the sample snippets to the popular songs that used them in two listenings of the tracks. Identifying which music elements the tracks had in common, however, proved more arduous. Nthabi, for example, identified that Camila Cabelo had sampled the 'backing singers' from Christina Aguilera's *Genie in a Bottle* in her track *Crying in the Club*. She and her group struggled, however, to identify that it was the melody that these backing singers sung that was similar. Some students, such as Travis, Diale and Ethan, embarked on the task with enthusiasm and rigour, but I noted a general lack of perseverance in others. Checking in on Emma's progress, we had the following exchange:

Emma:	The feeling is the same.
Teacher:	Yes, okay, great… what do we call that element though?
Emma:	[stares blanky]
Teacher:	Have a look at our big mind map on the board… remember… maybe… character.
Emma:	Oh, ja. [crosses out 'feeling' and writes 'character']
Teacher:	Okay, great… so what else is the same?
Emma:	[shrugs] Nothing really.
Teacher:	Okay… I think there are a few more things… but let's look at differences first. What's different here?
Emma:	I can't really hear anything… it's mostly the same.
Teacher:	Okay… but you said that only character was the same in this block… if only one thing is the same then everything else should be different, shouldn't it?
Emma:	[stares blanky]
Teacher:	I know this is tricky, but listen some more. I'm sure you can hear some other things to add.

My findings from Lessons 2 and 3 were, first, a general improvement in most students' self-regulation competencies. All students engaged in Lesson 2's task fairly easily, and readily shared their ideas with one another, but found Lesson 3's task more challenging. Some students even gave up, showing a lack of perseverance. They all responded to hearing 'their music' in class, however, even if they could not yet articulate detailed responses, all of them could see that we were exploring music-theory content in the context of their own lives. This, as well as the observations of students drawing on their practical experiences in defining the elements, reminded me of the value of situating the foundational knowledge in the students' own frames of reference.

Lessons 4, 5, 6 and 7: Copyright Court Case Project (18, 23, and 26 September, and 10 October)

Research Goals
• To what extent are the students able to critically listen to, and think about, music?
• Are the students able to curate relevant and reliable sources of information from various sources?
• Are students able to construct and support a creative and convincing argument using musical vocabulary?
• Are the students able to work successfully together in groups?
• Are the students able to present their arguments in a clear, logical, and professional manner?
• Are students able to execute their work in a free, unstructured lesson?
• Do students show evidence of considering their own learning and thought processes in developing their arguments?
• How do students respond to having their arguments questioned and contradicted?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Research & Inquiry Reasoning & Argumentation Interpretation	Communication Collaboration Self-Presentation	Initiative Self-Direction Productivity Responsibility Self-Regulation	Information Literacy Media Literacy	Creativity Metacognition Curiosity Flexibility

Lessons 4, 5, 6 and 7: Description

Students were given one lesson to prepare their arguments for or against their 'client's' copyright infringement and three lessons to argue their cases. The use of actual cases added a sense of expectation and urgency to the proceedings, which I amplified by using legal jargon such as 'order in court', when the students made a noise, and by referring to the students as 'councillors' and 'jury members'. The students responded with excitement to our foray into role playing and began calling me 'your honour' when asking questions. As 'judge' my main role was to maintain order and keep proceedings moving forward. I did not decide the cases and left this task entirely to the student jury, who voted at the end of each case. I spent my time observing the arguments and recording my results on the rubrics I had designed for these lessons.

Simulated real-life contexts, according to Brundiers et al, provide students with "hands-on experience in how to link knowledge to action" (2010, 312) and I certainly found this to be true. The students had had the opportunity to explore each of the elements of music through practical work in Cycles 1, 2 and 3, but it was not until Cycle 4 that they began to really understand the 'utility application' of this knowledge. As Vega asserts, too, "students

learn best by experiencing and solving real-world problems" (2012), and I observed this here, noting how students generated deeper understandings of their foundational knowledge of music during the course of this project.

Lessons 4, 5, 6 and 7: Observations – William Smith vs. The Weeknd

William Smith et al. vs Abel M. Tesfay ('The Weeknd') et al. 2:19-cv-02507	
Complaining Work	Defending Work
William Smith, Brian Clover, Scott McCulloch 'I Need to Love'	Abel M. Tesfaye ('The Weeknd') 'A Lonely Night'

Table 6.2: Court Case 1 Information (GW Law Blogs)

Ethan and Emma were assigned to defend the Weeknd after William Smith filed a law suit against him. Smith claimed that the Weeknd's song 'A Lonely Night' (2016) copied his 2005 song, 'I Need to Love'. Smith was represented by Pelo and Paul. Pelo's lack of enthusiasm when I told her that she would be working with Paul was palpable, and she made a loud objection to the fact that she could not chose her own partner. I explained that, in the real world, we are often expected to work with people we don't necessarily get along with and this would be good experience. She relented, but spent the remainder of the preparation session sulking and all but ignoring Paul.

Ethan and Emma listened to both songs before informing me that they were "not really the same" and therefore could not argue the case. As a researcher, I did not want to intervene; as a teacher, I assured them that there were similarities and insisted that they invest more effort into discovering these. A lack in ability to execute skills is something that I had noted in both of these students in the preceding research cycles, and I tried to emphasise these skills by pointing them out on the self-assessment rubric and explaining my expectations more thoroughly. This did prompt a slight change in attitude, and they continued working.

Pelo and Paul argued their case first, briefly claiming that the backing track and 'vocalisations' were the same in both songs. These were the only claims they made and they prepared no evidence in terms of musical extracts to support them.

When Ethan and Emma mounted their defence, Emma was adamant that she would not talk in front of the class. I was surprised: although a somewhat shy student, she had not shown any aversion to this in the past. Ethan went solo, admitting that the tunes were

similar, but claiming that everything else about the songs was different. When asked to continue, he indicated that he had nothing else to say, nor any evidence to produce. I suggested that Emma, who was still refusing to speak, whisper her contributions to Ethan, so that he could present them on her behalf, but she didn't. Ethan thus found himself arguing against the clients he was representing.

When I asked the 'jury' (the rest of the class) to cast their votes and opened up the floor for comments, it became even more interesting. The jury voted in favour of the prosecution, showing some disappointment in the arguments they had heard. Priya pointed out that the defence team had essentially proven the prosecution's case, while Ben noted several similarities and differences he had picked up in just one listening 'in court'. Travis commented that having listened to the songs it was clear to him that the defence team should have won, but he had felt that he had to vote for the prosecution based on the arguments that were delivered.

Lessons 4, 5, 6 and 7: Observations – Radiohead vs. Lana Del Rey

Radiohead vs Lana Del Rey et al.	
no case number available	
Complaining Work	Defending Work
Radiohead	Lana Del Rey et al.
'Creep'	'Get Free'

Table 6.3: Court Case 2 Information (Snapes 2018.)

Kylesh and Mike were assigned to represent Radiohead, who felt that Lana Del Rey's song 'Get Free' (2017) bore a striking resemblance their song, 'Creep' (1992). Lan Del Rey was represented by Josh and Jack. I noticed how Kylesh and Mike's productivity and self-regulation improved during the preparation for their court case, competency areas neither of them had been particularly strong in before. They listened to both songs before making individual lists of what they heard. I also observed them 'conducting experiments', as they called it, where they played both songs at the same time to compare the tempo, for example. As a teacher, I found it a welcome change not to have to remind these students to regulate their behaviour and get back to work.

Jack worked diligently on his case preparation, while Josh seemed disinterested. He struggled to construct a case, as the songs were so similar but, where he did note differences, he used the correct terminology to identify and describe each element. Kylesh

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and Mike presented their case in a matter-of-fact manner and I noted a drastic improvement in Mike's self-regulation and self-presentation skills, since his instrument presentations (see pages 125 and 146).

Josh was absent from school on the day their court case was scheduled, so Jack was left to present their case on his own. He had prepared a good argument, but struggled to clearly convey his points, and even admitted that he didn't think his client should win. The jury naturally voted in favour of the prosecution adding that Jack should not have admitted defeat.

Lessons 4, 5, 6 and 7: Observations – Matt Cardel vs. Ed Sheeran

HaloSongs, Inc., Martin Harrington, Thomas Leonard vs. Ed Sheeran, et al. 8:16-cv-01062 (C.D. Cal. 2016)	
Complaining Work	Defending Work
Matt Cardel 'Amazing'	Ed Sheeran 'Photograph'

Table 6.4: Court Case 3 Information (GW Law Blogs)

Ben and Priya represented Matt Cardel in his case against Ed Sheeran, claiming that Sheeran's 2014 song 'Photograph' bore a striking resemblance to Cardel's 'Amazing' (2012). Ed Sheeran was represented by three students – Trinesh, Travis and Diale – because Ben and Priya had demonstrated that they were developing formidable analytical skills and had a firm grasp of terminology. The 'defence' conducted thorough research, drawing on various online resources, and even finding a copy of the actual 'complaint' that had been filed with District Court of Southern California against Ed Sheeran by HaloSongs Inc. This 'real court document' did not provide them with much useful musical information, but was an intimidating piece of evidence in their argument – even though it had been filed by the prosecution's client. Trinesh, the most musically advanced member of his team, made several musical observations that were also included in their argument.

Ben and Priya presented their case first. They played various snippets 'in court' in order to illustrate the similarities in instrumentation, range, melody, genre, articulation, and harmony.

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Figure 6.7: Ben and Priya animatedly argue their case.

Diale was absent on the day his team's case was presented, but Travis and Trinesh took this in their stride. Travis objected to Priya's claim that the tempos were the same, stating that they had measured these and found that the prosecution's song was 5 beats per minute slower than theirs. Despite the obvious audible similarity between the two tracks, the defence team remained adamant that the songs were completely different and even indicated that they were offended by the prosecutions claim on Ed Sheeran's behalf. The theatricality of this court case was very entertaining, but it did not distract from the valid musical arguments that they made. Ben and Priya, however, were quick to object to most claims, and presented clear and well-articulated reasons for these objections.

After a spirited debate, the jury voted in favour of the prosecution (Ben and Priya). Despite the excitement generated, the class's self-regulation skills were evident. Just a few months before, the students would not have been able to sit quietly, focus, listen, and critically evaluate a session of this length.

Lessons 4, 5, 6 and 7: Observations – Flame vs. Katy Perry

Marcus Gray, et al. v. Katy Perry, et al. cv-05642	
Complaining Work	Defending Work
Flame 'Joyful Noise'	Katy Perry 'Dark Horse'

Table 6.5: Court Case 4 Information (GW Law Blogs)

Dinka, Vuyo and Nthabi defended Katy Perry's 'Dark Horse' (2013) which was accused of copying 'Joyful Noise' (2008) by Flame's team: Kevin, Nandi and Tim. The defence team started by making a comparison table that they modelled after the worksheet I had given them during the sample match exercise. Nthabi and Vuyo populated this table with their

musical observations, while Dinka conducted additional online research. Although the facts he uncovered were not musically relevant, the biographic details, YouTube view statistics, lyrics and personal testimonials he found, did make a valuable contribution to the overall case, and I ensured that I noted his initiative and creative approach to the task on my rubric.

The prosecution struggled to find their footing in this project. Both Nandi and Kevin seemed disinterested in the project and Tim was, once again, left in a position where he had to deal with two challenging team mates. After several requests, Kevin finally joined Tim and contributed to the project, but Nandi continued to treat the case preparation session as a social engagement.

Kevin and Tim presented their case confidently. Nandi did contribute, but was uncharacteristically quiet and was clearly not as prepared as the rest of her team. The defence claimed that the chord progression, beat, tempo, timbre and melodic riff used in 'Dark Horse' had all been taken from their client's song. I noted a considerable improvement in Tim's confidence and presentation skills since his instrument design presentation, where he had not uttered a word.

Unfortunately, Nthabi was absent during her team's allotted session, so Dinka and Vuyo were left to argue their case. Vuyo presented the musical evidence, where she pointed out that the structure, main melodic line, genre and tempo of the pieces were different. Dinka then presented his findings, noting that Katy Perry, who had grown up as a minister's daughter, had mentioned that she did not listen to Christian music in an interview he referenced. Flame was a Christian Rap group, so he argued that it was unlikely that Perry would ever have heard the prosecution's song. Dinka also went on to quote the number of YouTube views and likes each of the songs had received, with Perry's statistics reaching the billions and Flame's only reaching the millions. Dinka added that a number of Perry's songs – ones that had not been accused of copyright infringement – had similar numbers of views. He extrapolated that Perry was an incredibly successful musician and would not have been aware of Flame's song, or needed to copy this piece in order to generate a hit. Although these arguments were not necessarily relevant in terms of the guidelines I had set, where I had specifically asked for musical evidence, it was interesting to watch Dinka's analytical skills and creativity in action.

The jury was quite taken by the arguments presented by the defence, with Mike offering a detailed conspiracy theory in which Katy Perry had especially claimed that she did not listen to Christin music, so that she could steal it and get away with it. Ultimately, the jury found in favour of the defence (Dinka and Vuyo). Following this victory, Dinka very courteously thanked the prosecutions for putting up a good fight, and shook each of their hands (Figure 6.8).

Figure 6.8: Dinka reaching out to shake his opponents' hands.

Lessons 4, 5, 6 and 7: Observations – Marvin Gaye's Estate vs. Robin Thicke

Pharrell Williams, et al. v. Bridgeport Music, et al. 895 F.3d 1106 (9th Cir. 2018)	
Complaining Work	Defending Work
Marvin Gaye 'Got to Give it Up'	Robin Thicke, et al. 'Blurred Lines'

Table 6.6: Court Case 5 Information (GW Law Blogs)

The most viciously fought classroom court case took place between Marvin Gaye's Estate's team of Lesedi and Sameer and Robin Thicke's defence team of Mia and Kate. Marvin Gaye's Estate claimed that Thicke's 'Blurred Lines' (2013) copied Gaye's 1997 hit 'Got to Give It Up'. Lesedi and Sameer approached their case preparation by analysing the pieces separately and making their own lists of similarities and differences. They then compared the lists and discussed the findings. They mentioned that they were modelling this idea "like the other listening things we did". It was interesting to note that they had chosen to adopt the think-pair-share method we had used in the past as a strategy for completing the project in a productive manner.

Kate and Mia worked through their analyses together, transcribing parts of the melodies after playing them by ear. They started their case by writing out a list of 10 similarities between the two pieces including the bass lines, the funky character, the guitar riff, the melody lines and the vocal inflections. The prosecution also claimed that the tempi of both pieces were the same. This sparked the following exchange:

Kate:	The tempo as well, they're exactly the same.
Lesedi:	I object!
Teacher:	Okay, sustained, why are you objecting?
Sameer:	It's been proven by many sources. Many reliable sources, including the courts, say 'Got to Give it Up' is 122 bpm and 'Blurred Lines' is 120 bpm.
Kate:	[rolls eyes]
Mia:	They don't have to have the same bpm
Kate:	Guys, two…. two…
Lesedi:	No, no, they're two different tempos. You made a false accusation
Jury:	Ooh! Wow! [clapping]
Teacher:	No, order in the court!
Lesedi:	[snapping her fingers at Kate]
Kate:	As we both know, we both play the piano, and two beats is almost… is exactly the same thing. They don't even have it on the metronome, they have every four to six. [with aggressive body language]

Kate was clearly thrown by this exchange, but she and Mia managed to continue with the case, playing various extracts from both songs to illustrate their points. The analysis conducted by these students was of a much higher standard than in any of the preceding cases and, as a teacher, I was pleased to see Kate working to her full potential, after her less impressive performance in the instrument project.
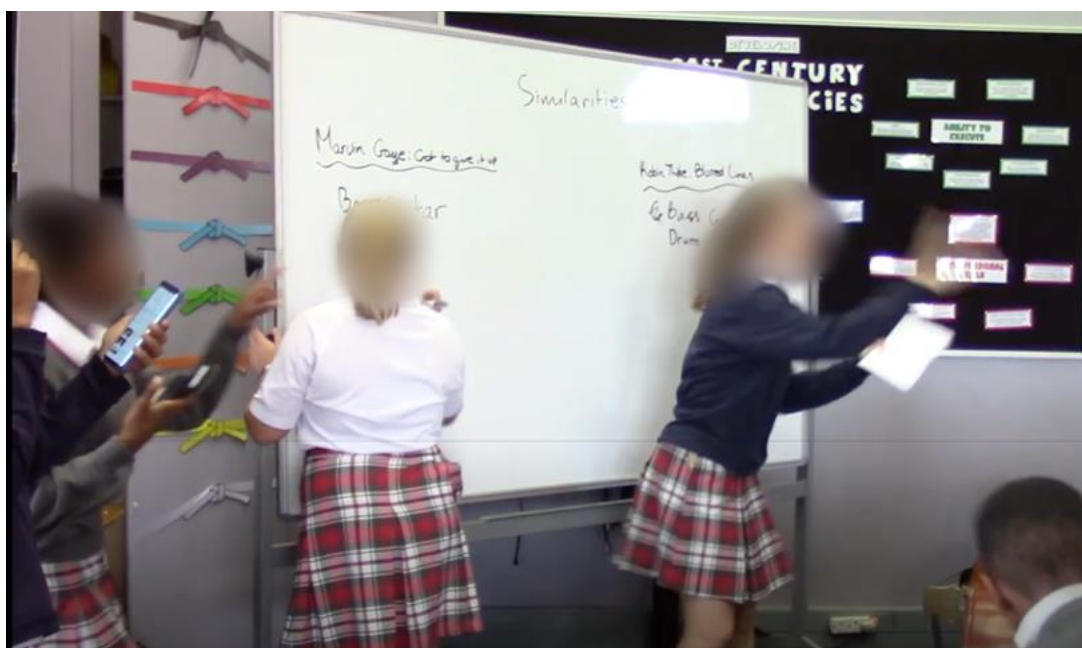
Figure 6.9: Kate angrily shakes her finger at jury members, telling them to 'butt out', while Lesedi continues to accuse Kate of making 'false accusations'.

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Sameer and Lesedi also presented a well-constructed and musically sound defence. They noted that the two songs were listed under different genres: funk/soul and contemporary RnB, and noted that while the groove of the two pieces was similar, the rhythms were different. Lesedi made a big point of the fact that the tempi were not the same. In contrast with preceding court cases' spirited debate, these two teams became quite aggressive, with Lesedi yelling 'overruled' in Kate's face when she tried to object. The jury ultimately voted in favour of the defence (Lesedi and Sameer).

Lessons 4, 5, 6 and 7: Findings

Dividing the class into groups with similar competency profiles (see page 162) provided interesting insights into the way the overt development of 21CCs helps to complete a task. The two groups with the least developed profiles were unable to mount successful arguments, lacking the critical edge, slick presentation, and well-constructed arguments I observed in the other groups' presentations. I noted a continued improvement in the students' self-regulation skills, which in Cycle 3 had improved to a point where they were better that their perseverance ratings. As tasks became more demanding, students had a more difficulty persisting. I also noted a correlation between perseverance and curiosity. The students who were excited and intrigued by the court case project generally invested more effort into their preparation and achieved a better outcome. Throughout the first two cycles I had observed an improvement in the students' interpersonal skills, but in Cycle 3 some students struggled to remain calm and objective when arguing their cases. The inherent conflict within a court case provided both an interesting challenge for the students, and an opportunity for me to observe how the students conducted themselves under pressure. In addition to the competency development noted, the students acknowledged the development of their musical content knowledge:

> I like the way we… so we do the music theory, but we do it with the court case too, to also help teach it to us (Dinka, Term 3 Focus Group 24 October 2019).

> I think the court case really helped. I learnt a lot more musical terms during that. (Mia, Term 3 Focus Group 24 October 2019).

Instrument Karate – Purple Belt (Due Date: 10 October 2019)

Research Goals
• Is the student able to present themselves in a confident and professional manner?
• To what extent has the student engaged with and applied the information presented in the flipped classroom material?
• Did the student show evidence of having worked through challenging aspects of the task?
• Could any indications that the student had considered and corrected their process be seen?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Self-Presentation	Perseverance	Information Literacy	Metacognition

Purple Belt: Description, Observation and Findings

While we were working on the copyright court cases in class, the students continued to hone their practical skills at home. In order to complete their Purple Belt, they had to learn a scale and submit a video presentation of three short pieces (Figure 6.10) that made use of all of the notes of the scale, all the note values learnt already, dynamics, and articulation.

Figure 6.10: Euphonium Karate – Purple Belt

I observed a similar trend that I had seen in the Blue Belt (see page 158): students who had persevered to generate pleasing results in the Blue Belt showed signs of improved perseverance in the Purple Belt, seemingly building the emotional 'muscle' needed to continue practising. Those who faltered were again unable to successfully complete their pieces. The self-assessments, too, showed that students attributed their inability to perform to lack of staying power or failure to problem solve.

Learning to play a single scale in crotchets, quavers, minims, dotted minims and semibreves is obviously rudimentary work. The students who participated in the instrumental karate would have clearly made far greater progress had they attended weekly individual lessons with a specialised private teacher. Unforatunately, this opportunity is afforded to very few students in South Africa and even within Redhill's affluent population, several students are unable to take individual music lessons, due to the added fees involved. The flipped classroom and instrument library rental scheme did however give students access to instruments and tuition, and as various people have noted, playing an instrument even at elementary level is worthwhile in and of itself (see Schlaug et al. 1995, Chan 1998, Gaser et al. 2003, Schalug et al. 2005, Hyde et al. 2009, Cicetti 2013, Gordan et al. 2015, Costandi 2016). In my research, the act of essentially teaching yourself to play an instrument came with an added layer of responsibility, but also benefits. Not every student coulsd fulfil the objectives (seen in Figure 6.10) of playing the correct notes with a strong, even tone, maintaining a steady pulse while playing the correct rhythms, and following every dynamic and articulation mark. Every student did grow through the experience of learning to play an instrument, however, and developed 21CC regardless of their musical proficiency.

The competencies acquired in this process, including the student's ability to recognise which deficits in their competency profiles hampered them from making *more* progress, are discussed in Chapter 7.

Lessons 8 and 9: Ensemble Classes (21 and 30 October)

Research Goals				
• Are the students able to apply their content knowledge in a new way and interpret the signs and symbols on a score to produce a performance? • To what extent are students able to collaborate in order to create a performance? • To what extent do students persevere through challenging aspects of this task? • Are students able to regulate their behaviour when they have the added temptation of playing their instrument?				
Analytical Skills	**Interpersonal Skills**	**Ability to Execute**	**Information Processing**	**Capacity for Change**
Problem Solving	Self-Presentation	Perseverance Responsibility Self-Regulation	Information Literacy	Metacognition

Lessons 8 and 9: Description, observation and findings

I used the last two teaching lessons of the school year (24 and 30 October 2019) to revisit ensemble performance. By this stage, every student had completed the karate purple belt. This meant that they could play an octave scale, could read rhythms in quavers, crotchets, minims, dotted minims, and semibreves; and could show dynamics, articulation and character on their instrument. Rather than continuing with improvisation, I wanted the students to learn how to collaborate in an ensemble while following a score individually. I arranged a South African jazz standard, Strike Vilikazi's, 'Meadowlands', for the class to play together. I created instrumental parts of varying difficulty for the students' different levels that were still challenging, bearing in mind Vygotsky's notion of the 'Zone of Proximal Development' (1978) to place my expectations just beyond the students' comfort zone in order to provide the optimal opportunity for growth.

After discussing the history and significance of 'Meadowlands' as a protest song, we began looking at the score, at the signs and symbols, and how they related to the elements we had studied:

Teacher:	Okay, what do we see here?
Mike:	Notes!
Teacher:	But what do the notes tells us?
	[Whole class shouts at once]
Teacher:	No… no! One at a time! Shhh! No! Lesedi?
Lesedi:	What pitch to play and…
Teacher:	Okay. Next person… let everyone have a turn… Jack?
Jack:	The 'F' means play loud.
Teacher:	Good, what element is that?
Jack:	[Grabs his head as he tries to think]
Kevin:	Dynamics!

Teacher:	Thank you, *Jack*! Okay… what else? Trinesh?
Trinesh:	How long you should hold the notes… the crotchets…
Teacher:	Yes, but give me an element…
Trinesh:	Beat… no, rhythm!
Teacher:	Great. Anything else? Look right at the beginning, just after your clef.
Dinka:	Four over four!
Teacher:	Yes, what element is that?
Mike:	Pulse!
Teacher:	Yes, we're counting the pulse in four beats, but I'm looking for the name of the element. Kate?
Kate:	The time signature.
Teacher:	Yes, it's a time signature, but that's still not the element I'm looking for? Anyone?... No?... Okay, remember meter?... Anyone else? Ok… Lesedi, go again.
Lesedi:	I have harmony.
Teacher:	Yes, you do! Lesedi is the only one with harmony. Why is that?
Lesedi:	'Cause I have the best instrument.
	[Lots of shouting from the class]
Teacher:	Okay… but what maskes your instrument special? Why can you make harmony?
Lesedi:	I've got chords (Class Observations Footage 21/10/2019).

I gave the students fifteen minutes to play through their parts, which the more experienced students with more challenging parts used productively. Others used the time to make strange sounds, swap instruments and chat to their friends. I reminded them that I was expecting good self-regulation and productivity skills, by referring them to their self-assessment rubrics. This seemed to galvanise most of them, except Josh, who had completely dismantled his clarinet and laid the various pieces out on the floor.

I observed that all the students worked well in their groups. The four trumpeters worked together best, with Mia and Trinesh, the two more advanced players, assisting Jack and Kylesh. In other groups: Priya took Emma under her wing and wrote the fingering of her violin part on the score. Even though Ben had decided to try a new instrument, the euphonium, in this project, he was an accomplished guitarist and so he put his own instrument down to go and help Dinka with his guitar part. Even students who were beginners themselves assisted their peers. Tim demonstrated where Nandi should put her fingers to play some of the notes she had forgotten on the clarinet, for example, and Nthabi ensured that everyone in her saxophone group could see the music and knew what to do. The interpersonal competencies that had dwindled somewhat during the conflict-riddled court cases re-emerged in this setting and I saw evidence of more highly developed collaboration and empathy.

The first few attempts at playing the song together did not produce a pleasing result. The students struggled with the idea of sticking with the beat, pausing before more challenging passages, playing at their own tempi (despite me beating out the pulse on a drum), and repeating notes that had not sounded the first time they attempted them. I explained how important it was to listen to and keep up with the rest of the ensemble, and asked Lesedi and Kate to demonstrate this. I had given them complex parts to ensure that they were challenged, and although they had made excellent progress in the allotted time they were by no means perfect. Despite this, they played through them, sticking with my beat. I pointed out to the class how Kate, in particular, had skipped over some of the runs I had written in her part, so that she could keep up with my beat. I encouraged all of the students to aim to do the same and keep pace with others in their ensemble.

The rest of Lesson 8 and the whole of Lesson 9 were spent workshopping difficult passages: discussing how repeat bars work, running through the piece instrumental sections by sections, and troubleshooting problems. By the end of Lesson 9, the students were able to produce a pleasing collective performance. Self-regulation remained a challenge during preparation: the temptation to make noise on your instrument while another group works through a difficult passage is there even for adults and it was far too strong to bear for some students. Thus, I found myself constantly asking for silence from the students who were not supposed to be playing. I found the level of collaboration and empathy in Lessons 8 and 9 generally of a high level, with students readily helping one another and also saw higher levels of perseverance than were noted in the instrument karate belt videos submitted during this cycle. I attributed this to the responsibility the students felt to one another. I had explained that an ensemble was only as strong as its weakest link, so the students felt accountable to one another, and also had one another to rely on for assistance and support.

Formal Assessments: Teacher Assessments vs. Research Assessments

At the end of the school year, I had to provide the school with a series of marks for my Grade 7 students, that had to include a class test, an examination, and other pieces of class work. The breakdown of my final mark can be seen in Table 6.7.

Classwork 60%					Examination 40%
Continuous Assessment 45%				Formal Test 15%	
Instrument Project 10%	Copyright Court Case 10%	Ensemble Participation 10%	Instrument Karate 15%		

Table 6.7: 2019 Music Mark Breakdown

Throughout this dissertation, I have reported on my research findings rather than my students' results, although of course these often correlated (see page 17). As a teacher, I marked according to criteria based on expectations of learning. Figure 6.11 shows an example for the karate belts. The criteria were simple here: one either played the right notes, rhythms, etc. or not. Each of these criteria were awarded a mark out of 10. The marks awarded for each of the karate belts were tallied and constituted 10% of the final music result.

What I will be looking for in your video…

1) Are you playing the correct notes?
2) Are you playing with a strong, even tone?
3) Are you keeping a steady pulse?
4) Are you playing the correct rhythms?
5) Are you playing the correct dynamics?
6) Are you playing the correct articulation?
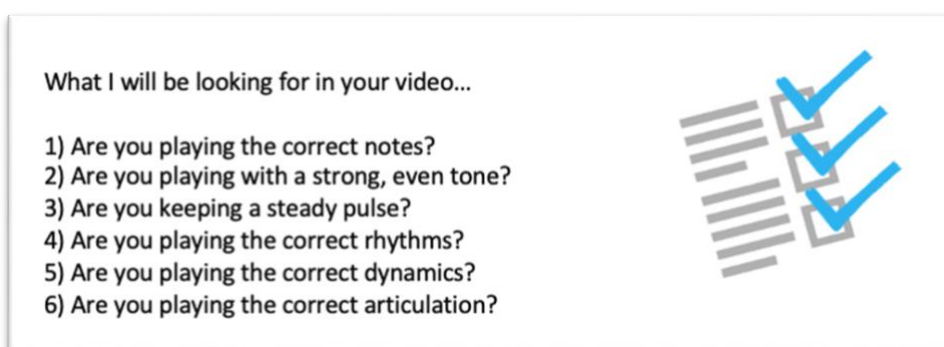
Figure 6.11: Instrument Karate Expectations

As a researcher, I assessed the students' karate belts using different criteria, as laid out in the 'research goals' windows throughout Chapters 3, 4, 5, and 6:

- Is the student able to present themself in a confident and professional manner?
- To what extent has the student engaged with and applied the information presented in the flipped classroom material?
- Did the student show evidence of having worked through challenging aspects of the task?
- Could any indications that the student had considered and corrected their process be seen?

I noted them as 'emerging', 'developing', 'proficient' or 'exemplary' and used the data collected to generate competency profile maps.

The class test and examination results that I was required to provide were conducted in a similar manner. As a teacher, I assessed musical proficiency, but as a researcher, I observed 21CC development. The academic music mark that was awarded did not take the 21CC observations into consideration. These 21CCs obviously aided the students in achieving their musical goals, however, just as the music had in various ways been the main vehicle for growth in a number of competencies.

Test and Examination Structure

Playing an instrument may have seemed like a subsidiary activity during this research project, relegated to the flipped classroom and mostly forgotten in our classwork, save a few ensemble lessons. This was far from the case: learning to play an instrument was central to this study and a common thread that ran throughout the year. For this reason, I decided to conduct a practical test and examination on the kind of work (playing an instrument) students had invested the most effort in throughout the year. As a researcher, I also noted that this type of assessment could potentially provide me with various opportunities to observe each of the 21CC being utilised.

Class Test (4 October 2019)

Research Goals
• To what extent are the students able to regulate their behaviour and work productively in a self-directed rehearsal setting?
• Are the students able to work successfully in groups?
• Are students able to interpret the information on their scores to create a successful performance?
• Do the students show signs of considering and adjusting their actions to achieve the desired outcome?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Problem Solving	Communication Collaboration Empathy	Initiative Self-Direction Productivity Perseverance Responsibility Self-Regulation	Information Literacy	Metacognition

Class Test: Description

For the class test, I divided the class into four groups: (1) saxophones (Diale, Vuyo, Nthabi and Pelo), (2) clarinets (Paul, Nandi, Josh, Kevin and Tim), (3) brass instruments (Mike,

Mia, Ethan, Jack, Ben, Trinesh and Kylesh), and (4) a mixed ensemble (Priya, Kate, Travis, Dinka, Sameer, Emma and Lesedi).

I arranged an extract of Beethoven's 'Ode to Joy' for each ensemble, ensuring the parts I wrote were appropriate for each student's capabilities. I chose this piece because most of the students had played the tune on the recorder during their primary school music lessons. I felt that a relatively simple and familiar piece would be the most appropriate choice for this first attempt at a completely self-directed ensemble performance. The students had worked on Meadowlands in a similar manner during Lessons 8 and 9 or Cycle 3, but I had guided them through this process. During the class test, I would not be available to offer guidance or assistance.

Each group was sequestered in a different classroom with nothing but their instruments, sheet music and a video camera to capture their progress. I offered no assistance and the only instruction I provided was that they would have to perform their piece as an ensemble at the end of the lesson. I did travel from group to group to ensure that they were on track, but refrained from offering any assistance unless specifically asked to aid with a faulty reed or other technical problem. These are the observations I recorded:

Class Test: Observations – Saxophone Group

All four of the saxophonists in the class had only started playing the instrument at the beginning of 2019. Nthabi, however, played piano before and thus could read music more fluently than the others. She went through the notes with the rest of her group and explained how the counting worked, particularly in the middle section where there was a quaver rhythm. Each member of the group then tried to play the piece by themselves.

Pelo had been unenthusiastic about most of the class work we had done throughout the year, producing mediocre work, at best. When it came to her practical work though, I noted higher levels of initiative, perseverance, and problem solving. Pelo picked up the piece relatively quickly, and played through it with only minor errors and a mostly fluent pulse. Nthabi was also able to play through the piece with sound production on certain notes as the only problem she experienced.

Both Vuyo and Diale struggled with the piece a little more than the other members of their group. Vuyo seemed intimidated by playing in front of her friends, and stopped and

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apologised every time she made a slight error. Diale struggled to play in the correct octave, with his saxophone squeaking whenever he tried to play the lower notes. In response to this, each of the other group members played their low notes and explained how they were manipulating their mouths and jaws in order to differentiate between high and low notes. While Diale continued to struggle with this, the collective troubleshooting the group had conducted did help and he improved over the course of the practice session.

Once each of the group members had had an opportunity to play the piece through alone, they played it in groups of two while the other two members clapped the pulse. When Pelo and Vuyo, the first group to attempt playing together, struggled with the piece, Nthabi suggested that they take some time to try and memorise the music, commenting that it would be easier to play if the muscles in their fingers knew what to do.

When the class got back together to listen to one another, the saxophone group played the piece slowly, but steadily, managing to stay in sync until the quavers in the middle section. Diale did play the melody an octave higher than the rest of the group for most of the song, but played the correct melody. Even though he was noticeably disappointed that progress he had made in this area during the practice session was not observable in the performance, he persisted and played the piece in time with the rest of his group.

Class Test: Observations – Clarinet Group

Two members of the clarinet group were absent during this assignment, so just Tim, Nandi and Paul practiced their arrangement of Ode to Joy. None of the students in this group took charge or made any attempt to formulate a plan of action, rather just working on their pieces individually, but simultaneously. Nandi and Tim were able to play their pieces after a few runs through, and I noted that they both picked apart the more challenging sections and gradually worked them up to speed. The karate videos allowed me to see the students perform on a regular basis, but I did not get to see their practice process, only the end result. And while the end result assured me that the students did practice with a logical approach to problem solving, it was interesting to actually be able to see this taking place.

Paul, on the other hand, did not use his time wisely. There was a piano in the room that this group practiced in, and he spent his time plonking on this instrument, wasting his own

practice time and distracting the rest of his group. He made just one half-hearted attempt at playing through the piece before the end of the session.

Despite the fact that they had not practiced playing together during the practice session, Tim and Nandi were able to perform the piece together during their class performances. They did shift in and out of sync in some places, but did surprisingly well given that they had not rehearsed this. Paul started playing with the group, but lost his place after two bars and was unable to re-join the performance.

Class Test: Observations – Brass Group

The brass group consisted of Mia, Trinesh, Jack and Kylesh on trumpet, Ethan and Mike on Trombone, and Ben on Euphonium. I was concerned about this group as it was larger than the others and some of the members could become quite excitable and get out of hand. Nevertheless, I gave them their sheet music and left them to organise themselves.

Mia quickly took charge, seating the rest of the group into their sections from highest to lowest and ensuring that everyone had a music stand and pencil. She instructed the low brass instruments, all of whom had only started playing their instruments at the beginning of the year, to write in their slide and valve positions. "Find a chart on yours phones if you need one", she added. While they did this, Mia turned her attention to the rest of the trumpet group, and she and Trinesh assisted Jack and Kylesh with their parts. Jack took to his part relatively easily, but Kylesh struggled with his part even though Mia wrote in the fingering for him. Kylesh's part contained a harmony to the main melody and he could not understand why the notes he was playing did not sound like the melody of Ode to Joy, that he knew. Trinesh explained that he had a harmony, at which point Kylesh tried to convince someone to swap parts with him, because he felt he was unable to play his part. Mia insisted that he keep trying and moved on with the rehearsal.

Once everyone had written in their valve and slide positions, they played through their parts section by section. Mia stood in front of each performer, tapping the pulse on their music stand to keep them in time as they played (Figure 6.12). Ben played his piece almost perfectly on his first attempt and received a round of applause from his very supportive team. Ethan and Mike struggled to keep in time on their first attempt, so Mia leant over their stand, pointing to each note as they played it. Mike played his notes with

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accuracy and confidence, but Ethan struggled to find the correct slide positions and played several incorrect notes. Mike did try to assist with this.

Figure 6.12: Mia helps the second trumpets play their part in time.

Jack and Kylesh played the second trumpet part together, as Mia kept time for them, but Kylesh gave up halfway through and just listened as Jack finished the piece. Once again, Kylesh objected to playing the harmony, but Mia told him in no uncertain terms, that he had been assigned a specific piece and had to stick with it. She gave Jack and Kylesh a second opportunity to play their part, and Kylesh made more of an effort this time. Trinesh and Mia played the first trumpet part with relative ease and were also applauded by their teammates.

After this, the whole group, minus Mia, played through the piece together. Mia stood with the trombones, pointing to their notes and counting out loud. The result of this first attempt at playing the piece together was very impressive and it was obvious that the students in the group were very proud of themselves. They practiced the piece together a second time, but this time Mia played with them.

In order to accommodate each group in a different classroom, I had had to ask one of my colleagues if the brass group could use her room, while she worked in her adjoining office. She had been able to listen to the whole process and commented that she had never witnessed such impressive group work before in all her years of teaching. This group gave the most successful performance during the class demonstrations, even though Kylesh did

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mime the second half of the song after losing his place, and their classmates were observably impressed by what they had managed to achieve in just half an hour of practice time.

Class Test: Observations – Mixed Ensemble

The mixed ensemble consisted of Kate, Priya and Emma on violin; Sameer on flute; Dinka on guitar; and Lesedi on piano. Travis was supposed to play a second flute part but was absent for this test. This group was not only 'mixed' in terms of its instrumentation, but also in terms of its members' abilities. Kate, Lesedi and Priya could each play at an advanced level and were members of the school orchestra, while Emma, Dinka and Sameer were relative beginners.

The more advanced players assisted their team mates with Kate writing the note names into Sameer's score, Priya writing the finger positions into Emma's part, and Lesedi playing Dinka's part on the piano while he played it on the guitar, so that he could ensure that he was playing the correct notes. Lesedi and Kate battled one another for control of the group once the rehearsal got underway. They both thought that they would be the most fitting leader for the group, with Kate claiming that the first violin should always lead an ensemble, and Lesedi stating that she would have a better sense of the structure of the piece from the piano part. Eventually Lesedi relented and Kate began leading the rehearsal, but there were several nasty comments between the pair. Rather than allowing each member to attempt their parts individually, Kate decided that everyone should play their parts together, but at a very slow tempo. The snail-like pace, although intended to help, confused the group and they were unable to play in sync with one another. Priya suggested a slightly quicker tempo, and this did help. Emma, Sameer and Dinka, however, remained confused and unable to play in time with the rest of the group.

Kate and Priya were able to play their parts perfectly after one or two attempts, so Priya offered to play Emma's part with her which helped. Sameer and Dinka slowly got used to their parts too, and were eventually able to play parts of the piece with the rest of the ensemble. During their class presentation performance, this ensemble was able to play through most of the piece together but fell apart towards the end of the song. Kate, Priya and Lesedi finished the piece alone.

Class Test: Findings

The class test provided me with previously unavailable insights into the practice methods the students had cultivated during the course of this study, and I noted high levels of perseverance, problem solving, critical thinking and metacognition in most students. I had noticed various perseverance levels in the karate belt submissions I received, but observed a general improvement in this competency in an ensemble setting. In fact, each of the individual student's abilities to execute competencies assessed in this task, showed growth. I attributed this, again, to the responsibility the students felt to one another. The students, in most cases, collaborated in an empathetic manner, with some conflict noted in one group. Mia was one student who stood out in this project for her 'exemplary' leadership skills, the likes of which I had not observed before in a student of her age.

Examination (28 November 2019)

Research Goals
• To what extent are the students able to regulate their behaviour and work productively in a self-directed rehearsal setting? • Are the students able to work successfully in a large group? • Are students able to interpret the information on their scores to create a successful performance? • Do the students show signs of considering and adjusting their actions to achieve the desired outcome?

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving	Communication Collaboration Empathy	Self-Presentation Initiative Productivity Responsibility Self-Regulation	Information Literacy	Metacognition

Examination: Description

The examination was similar to the class test, but instead of dividing the class into groups, I composed and arranged a piece for the whole class to play together. The examination also included a short written component that was completed online.

The music exam took place on 28 November, towards the end of the November Examination Session. The students had written formal assessments during the two weeks leading up to this exam and appeared used to conducting themselves in a regulated manner. There were strict rules in place that dictated that students were not allowed to

speak to one another in the exam venue and had to enter the room in silence. Even though this was a non-traditional exam, which took place in my classroom rather than the normal exam venue, the students entered in complete silence, quickly found their assigned seats, and set up their instruments. I had never seen my class be this quiet or get their instruments set up so quickly and noted that, by framing this session as an exam, the students approached the performance with a very different attitude.

The students were assigned a seat within a circle and were each given a music stand and a copy of their score. They were required to bring their instrument, a pencil and their iPad to the exam session. The questions in the online component of the exam were based on the score the student would play. The aim of this portion of the exam was to test the students' foundational knowledge, with regards to the elements of music. The test asked questions such as 'Identify the name of the highest note you will have to play in this piece', 'Describe the dynamics of this piece', and 'This piece is based on the twelve-bar blues. Explain what this means'. The students were given 15 minutes to complete the online portion of the exam, before I gave them the instructions for the practical component. I explained that the students would be given one hour to work on the piece in front of them. At the end of the hour, I expected to hear the whole class play the piece together, as an ensemble. The students were allowed to get up and move around, but were not allowed to leave the classroom. I would be sitting at my desk observing the rehearsal, but the students were not allowed to speak to me – I was essentially 'not there'.

Examination: Observations

The unexpected silence that I had witnessed at the beginning of the exam session was quickly permeated be many opinions, suggestions and arguments about the best way to approach the task. Diale managed to quiet the class, asking that everyone take turns to speak. "Remember she's watching, guys!" he added. Despite my attempts to disengage with the class and remain nothing but an observing eye, my presence, as well as the weight of being watched, was clearly still felt. Priya started by asking if everyone in the group knew the notes in their parts and suggested that those who could read music fluently help those who were uncertain of any aspects of their scores. There was a flurry of activity, as the students helped each other decipher their scores and I noted high levels of empathy and collaboration.

Once everyone was comfortable with the notes in their parts, the class decided to elect a leader. Kate, as the most advanced musician in the class, was the near unanimous choice. Though reluctant to take on this responsibility at first, she agreed and took charge. I had provided the group with a copy of the conductor's score and Kate used this to ask the class to each play their first note. Immediately, there were several suggestions from the group, with Trinesh, Ben and Mia pushing for sectional rehearsals. These three students were all part of the brass band during the class test performance. This group had clearly been the most successful in their performance, and I was surprised that this was not acknowledged and their method used in this exam session. Kate assured them that there was not enough time to conduct sectional rehearsals, believing that it would be quicker for the whole ensemble to work together, making their way through the piece bar by bar.

The class worked relatively well together, but did encounter behavioural problems along the way. The rest of the class was quick to remind their peers to 'self-regulate' and I noted that some of the student, who had struggled with this throughout the year, like Josh and Mike, made a concerted effort to focus on their work and not distract those around them.

The decision to work bar by bar resulted in slow progress, but the piece eventually started taking shape. The brass section was struggling with a particularly challenging rhythm in their parts, and Kate worked through this with them. While she was doing this, she enlisted Priya to help Emma and the flutes with their part. Mia and Trinesh were quick to point out that they had suggested sectionals at the beginning of the rehearsal, and Kate retorted with an abrupt 'Fine!'.

Allowing each section of the ensemble to play through their parts alone was a big step in the right direction and, as the brass started playing, Travis started clapping along. This was the first attempt at beating out the pulse in the rehearsal, and also a good step forward in the process. As the piece progressed Ben noted that Dinka's acoustic guitar part could not be heard at all. He suggested that Dinka switch to electric guitar, then proceeded to set this up for him. Ben had shown substantial growth in each of the competency areas throughout the year and I, once again, noted his wonderful display of empathy, critical thinking and problem solving. As the rehearsal neared its end, Sameer took over as the leader to allow Kate the opportunity to play her part along with the ensemble while, he counted out loud and cued the different sections. Despite the fact that Sameer had only started to play an instrument at the beginning of the year, he handled this task with confidence.

Once the hour was over, the class was able to perform the piece in its entirety, with only minor errors from a few ensemble members. Despite the minor slip ups, all of the students managed to start and end together.

Examination: Findings

The examination findings were similar to those observed in the class test (page 187). The students did, however, find working in a larger group more challenging, and the response to a lesson framed as an examination was noticeably different. When electing Kate as their team leader, the students mistakenly equated her musical prowess to her ability to lead. Although Kate was clearly a talented and knowledgeable musician and invested a noble effort in leading the rehearsal, she did not do so in a logical or critically thoughtful way. This highlighted for me that while musicians cultivate competencies through the act of learning to play an instrument, and those students with more highly developed competency profiles learn to play an instrument more easily, being a capable musician and having highly developed 21CC are not synonymous. The correlation between musical ability and competency will be investigated in Chapter 7.

Cycle 4 and Formal Assessment Competency Profiles

I had originally intended to include the test and examination in Cycle 4 and to combine the data I collected to produce a single competency profile. After seeing how differently the students approached work framed as an official assignment, however, I decided to separate this data into a class work profile and an assessment profile. The profiles generated during Cycles 1, 2 and 3 had included observations of class work only, so I felt that it would be more accurate, and the insights gained more beneficial, if the fourth cycle also included class work only. Figure 6.13 shows the Cycle 4 class work competency profiles in pink and the Formal Assessment competency profiles in purple.

| Paul | Ben | Vuyo | Mia | Ethan |
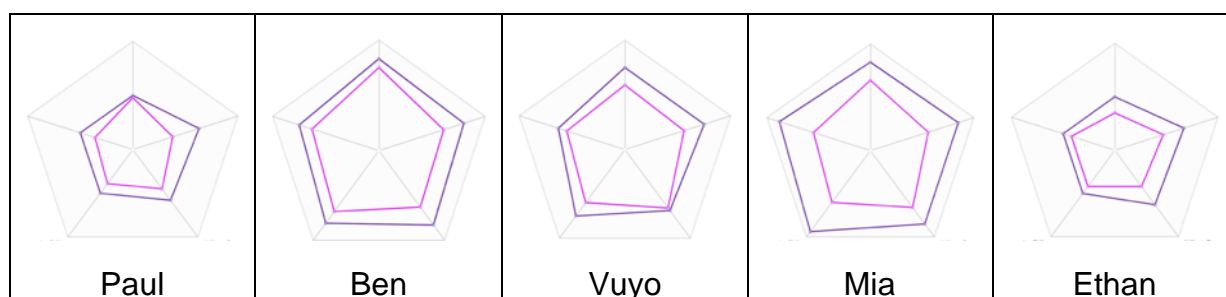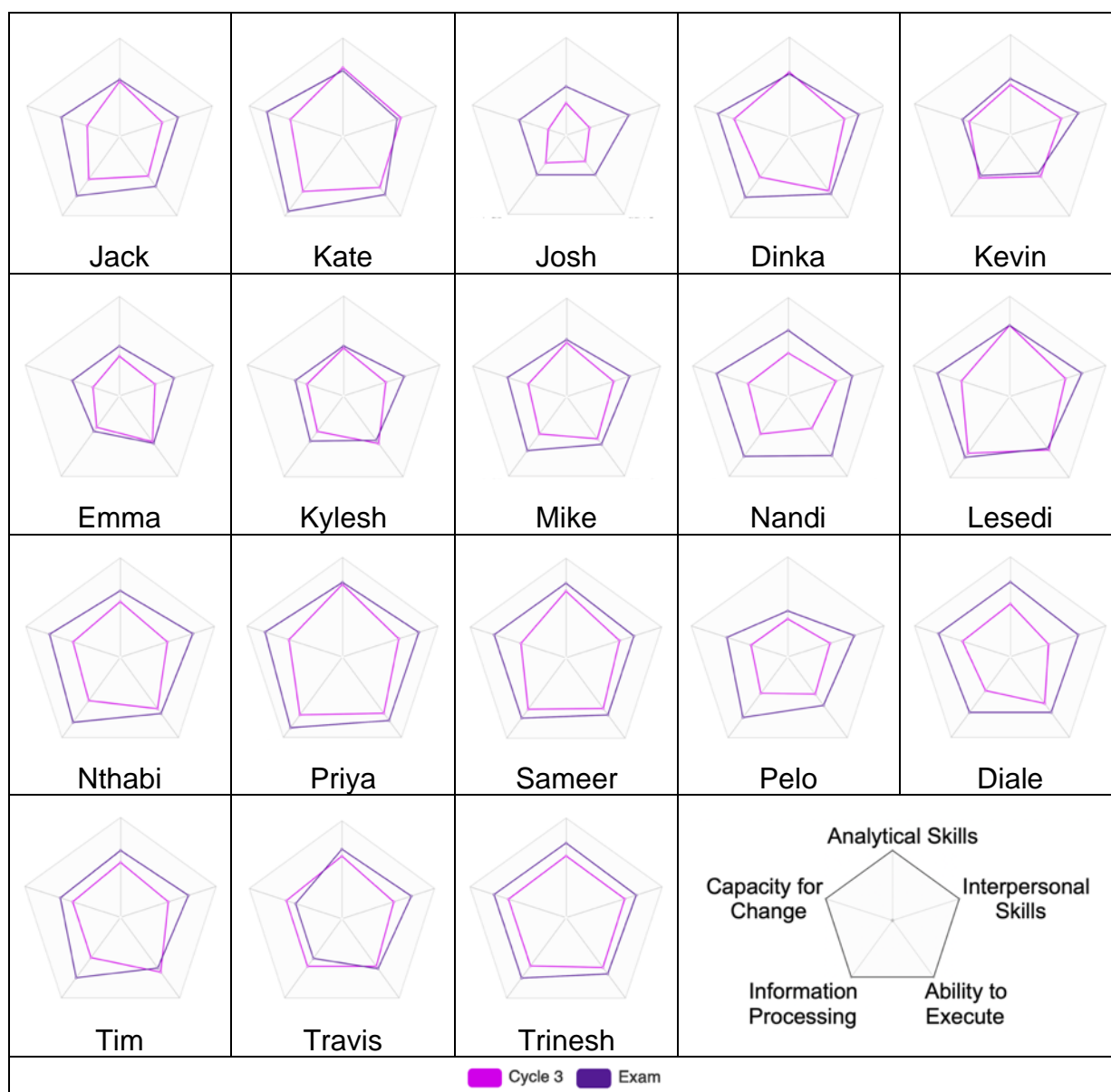
Figure 6.13: Cycle 4 (Court Case) and Formal Assessment (Student Driven Ensemble Performances) Competency Maps

Cycle 4 and Formal Assessments: Conclusion

The observations made during Cycle 4 and the Formal Assessments pointed towards potential answers to each of the research questions I set out in Chapter 1, particularly questions 1 and 2 which ask:

1. Which of the 21CC (as identified in the Theoretical Framework of this chapter) can effectively be developed through music?
2. Which pedagogical methods are most effective in developing 21CC through music?

While I was able to see development in each of the broad competency areas, I noted particular growth in the students' critical thinking, problem solving, and metacognition.

These sub-competencies were particularly observable during the solo instrumental video submissions and ensemble classes which, in this cycle, required the interpretation of more complex music, that included dynamic and articulation markings. I noted less perseverance from some students during their solo instrumental endeavours, but the same students demonstrated higher perseverance levels when working in a group. The group work that took place during the ensemble classes not only encouraged students to persevere through difficult tasks, but illustrated a continued improvement in the students' interpersonal skills. When these competencies were challenged in the inherently combative court case project, however, I did note a decline in this competency area in some students.

Chapter 7 – Case Study Summary and Findings

In Chapters 3 to 6 I showed the 23 students' gradually changing 21CC profiles. I was able to create them, as I have already said, by recording my class observations on a series of rubrics, which I then converted into numerical values that could be expressed as 'maps'. This summarised way of tracking competency development, as I explained in Chapter 1 (see page 10), is called competency profile mapping and has proven to be a useful tool in identifying, measuring and tracking shifts in competencies in various spheres, educational and otherwise. These profiles provide a visual representation, as it were, of the growth and development of each student throughout the project.

In this final chapter, I offer some more detailed insight into the creation of the students' competency profiles, analyse and compare the profiles from each cycle, and discuss the changes that occurred throughout the duration of the case study. I then discuss how the changes may or may not be attributable to the fact that in this particular case, music was the sphere of operation, and I further reflect on other factors that could be seen as contributing to change. Finally, I compare my research with existing research of a similar kind, and suggest ways in which my findings might be further developed and possibly transferred to other situations and contexts.

Competency Profile Map Creation: Rubrics

While observing each lesson, both in person during class (via hastily jotted notes) and later through recorded footage of the class, I completed a series of rubrics that assessed the students' competencies as 'emerging', 'developing', 'proficient' or 'exemplary'. I came to these four standards after sourcing various sets of standards in the literature. These include the adaptation of the medieval guild apprenticeship model, "Novice, Apprentice, Journeyman, Expert", by Andrew Walls (2018), Jeff Gran and Deborah Bushway's "Non-Performance, Basic, Proficient, Distinguished" (2014), and the slightly more graded "Completely Unfamiliar, Novice, Advanced-Beginner, Competent, Proficient, Expert" by Agnes Kiss (2019). I am also, of course, aware that these examples exist in a world of grading with which people are familiar from early childhood onwards. The entire schooling system in South African is captured in 12 'Grades'; the external music exams with which my students and young musicians worldwide are familiar run from pre-Grade 1 to Grade 8; and the latter are further known by the three broader levels of Elementary (Pre-Grade 1 to

Grade III), Intermediate (Grade IV-VI) and Advanced (Grade VII-VIII). The way in which school teachers worldwide grade practicals and papers by various means including, for example, letters (A+, A, A-, B+, B, B- etc.) are well known. In settling on a series of rubrics for assessing my students' progress in *competencies* as outlined in this dissertation, I felt that the standards of 'emerging', 'developing', 'proficient', and 'exemplary' used by the NYC Blended Competencies Project (see joanganzcooneycenter.org) were the most appropriate, and also the most easily understandable for my middle school students.

These rubrics enabled me to assess the groups of specific competencies within each of the five broad competency areas. I did not aim to assess every competency in every lesson. In most cases, I deduced in advance which ones I would be able to observe through a particular lesson and set up the appropriate rubric before the class. Sometimes, particularly in Cycles 2 to 4, however, I would encounter (during the lesson) signs of a competency that I did not expect to see. In these cases, I set up the appropriate rubrics retrospectively and assessed the competency levels through the footage I had recorded.

Table 7.1 shows how this worked, for example, for the problem-solving section of a rubric. I had to ensure that each standard was clearly defined, and clearly customised to suit a particular competency, so that I was able to remain consistent when rating each student's competency level.

Problem Solving			
Emerging (1)	Developing (2)	Proficient (3)	Exemplary (4)
• Unable to identify potential problems.	• Able to identify potential problems.	• Able to identify potential problems. • Able to identify a solution to the problem	• Able to identify potential problems. • Considers various solutions to the problem and selects the most appropriate one.

Table 7.1: Problem Solving Competency Standards

I was thus able to complete 30 rubrics that assessed 302 competencies altogether, some more than others at various stages of the research, and to express the results as a graph (see Figure 7.1).
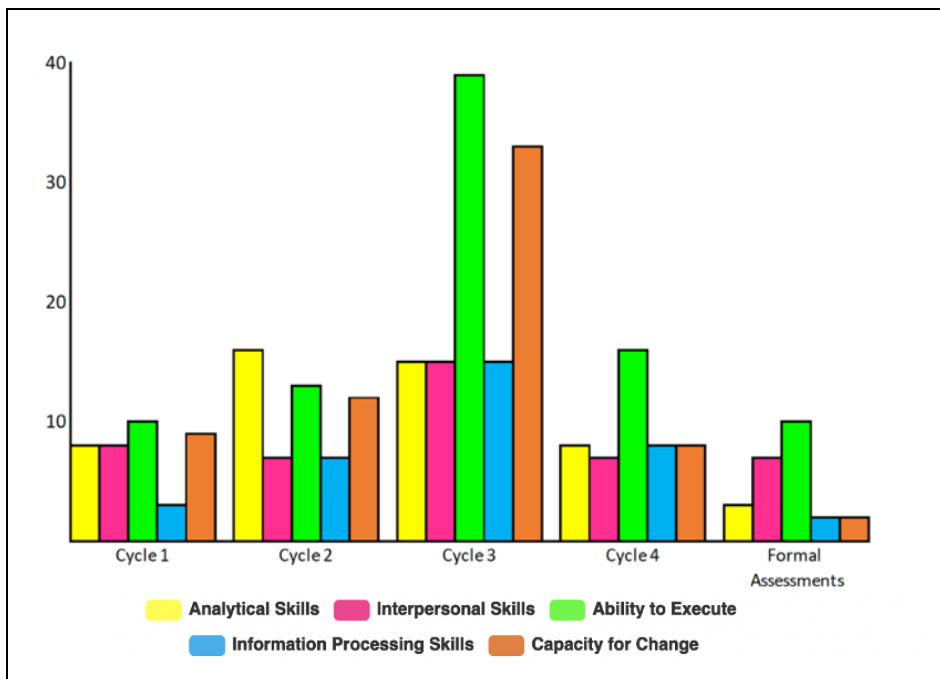
Figure 7.1: Number of Competencies Assessed in Each Competency Area in Each Research Cycle.

This graph shows a number of things: that there was a particular concentration of competencies assessd in Cycle 3 perhaps because it was the longest cycle; by the same token, the Formal Assessment observations took place across just two sessions. It shows that ability to execute competencies were particularly relevant to Cycle 3 where the electrophone was built and that, almost as important here, was to assess capacity to change – as the instrument underwent various stages and iterations due to rethinking, as well as to simple trial-and-error methods. It shows that in the final student assessments, at the end of the year, capacity for change and information processing skills were no longer quite so necessary to assess (it was finished products that were being assessed, rather) but that execution (playing) and personal interaction (performing with others) were. It also shows that information processing was the least assessed competency overall.

This is the first general finding of this study: that the uneven distribution of the number of competencies assessed is indicative of different broad competency areas being relevant to different activities within the music class. It follows from this that not all of the sub-competencies I originally listed in Chapter 1 could, I found, be successfully developed and assessed during this research.

A similar variation exists within my assessment of each broad competency area: not all sub-competencies were developed and therefore assessed, in every cycle. Again, this is ascribable to the different nature of the projects conducted in each cycle. The instrument

design project in Cycle 2, for example, demanded more innovative work than the court case in Cycle 4. Figures 7.2 to 7.6 show the breakdown of competencies assessed in each cycle. In Figure 7.2, which shows the Capacity for Change assessed in each of the five segments of the project (Research Cycles 1 to 4 and the Formall Assessments), it can be seen that three rubrics in Cycle 2 and six rubrics in Cycle 3 measured innovation, while this competency was not assessed in Cycle 1 or 4. Likewise, curiosity was not assessed in the formal assessments.
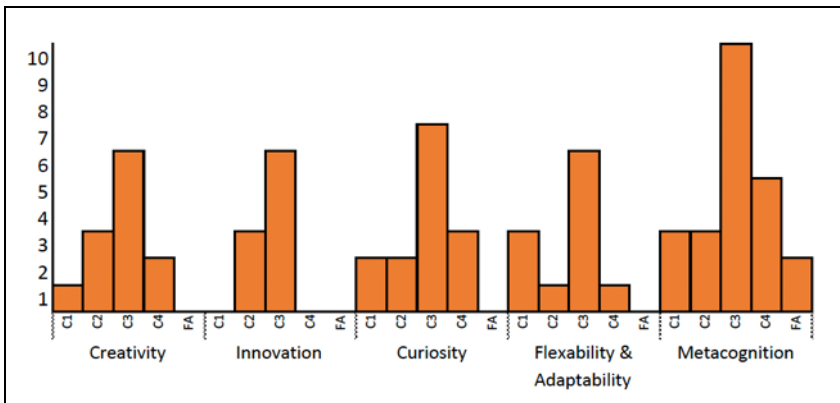
Figure 7.2: Capacity for Change Competencies Assessed in Each Cycle

Figure 7.3 show the information processing skills competencies that were assessed throughout the case study. As can be seen from this data, information literacy was the competency most significantly observed and developed in the music class. ICT operations & concepts were only observed during Cycles 2 and 3, when the students were working on the instrument project, as this project included the technological elements of coding and trigger sounds through electrical circuitry.
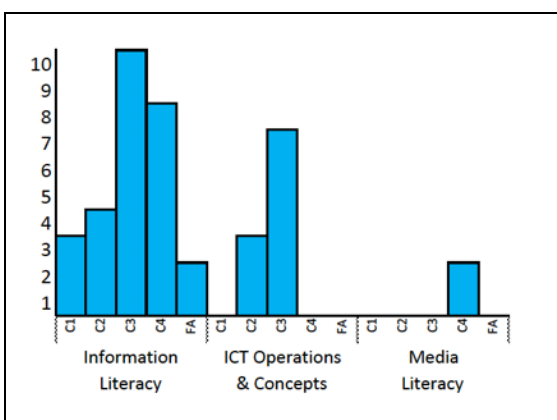
Figure 7.3: Information Processing Skills Competencies Assessed in Each Cycle

As I mentioned when presenting an overview of the five broad competencies in Figure 7.1 above, the ability to execute competencies were particularly relevant. As can be seen from

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Figure 7.4 below, almost every competency was assessed at least once in each research cycle.
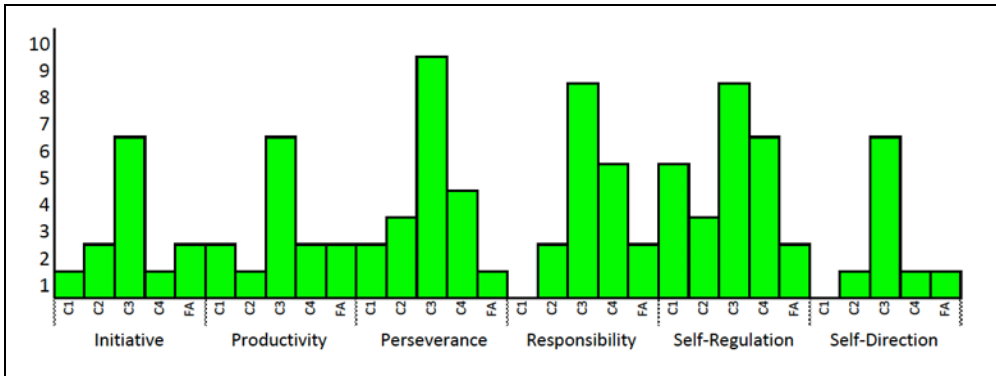
Figure 7.4: Ability to Execute Competencies Assessed in Each Cycle

The interpersonal skills of communication, collaboration and self-presentation were assessed regularly throughout the cycle, but empathy and negotiation were only observed in a few instances, as shown in Figure 7.5.
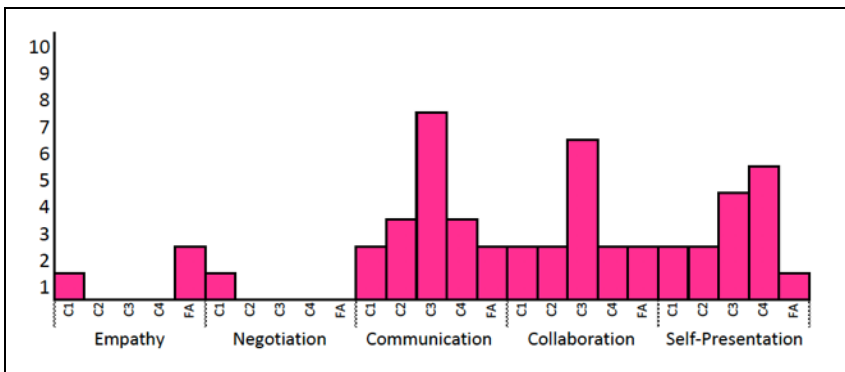
Figure 7.5: Interpersonal Skills Competencies Assessed in Each Cycle

Figure 7.6 shows the analytical skills competencies assessed throughout the case study. As you can see, critical thinking and problem solving were observed far more frequently than the other competencies under this heading.
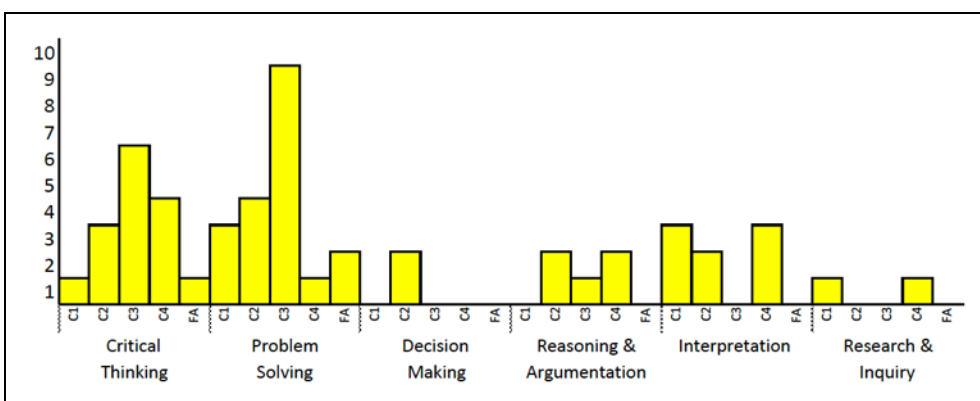
Figure 7.6: Analytical Skills Competencies Assessed in Each Cycle

As is evident, not every competency that I had set out to assess in my original framework was successfully assessed in the music class. I will discuss this finding in greater detail towards the end of this chapter.

Competency Profile Map Creation: Converting Standards into Numbers and Numbers into Graphs

The results recorded on each students' rubric for each lesson were captured on a Google Sheet and each standard was converted into a point value as follows:

Emerging   = 1 point
Developing   = 2 points
Proficient   = 3 points
Exemplary   = 4 points

The point score for each competency area was then calculated and converted to a percentage for each student, taking into account absenteeism, so as to produce an accurate representation of the student's abilities. I converted the points into percentages so that I could have a standard unit of measurement that I could analyse and compare across various competencies, cycles and students. A percentage usually indicates a part of a whole, but this was not the case here. The value of 50%, for example, did not indicate that a student was 'half-way-there' in a particular competency area. This was simply a uniform value that allowed me to see differing numerical information in equal terms. As I learnt when setting up this case study, and as mentioned in Chapter 2, there is no 'end point' in competency development. Neither is there 'whole' i.e. 100% score that a student can strive for – unlike in conventional exams or tests. Competency development is a lifelong journey and one in which, as the world changes, the goal posts move. Higher levels of competency are always potentially able to be developed. And students will always be expected to 'be developing' them.

The total values for each competency area, represented as percentages, were then plotted on a radar graph to compile a competency profile for each student. These allowed each student's specific abilities in the five broad competency areas to be compared and monitored throughout the four cycles of the research project.

As I explained when originally presenting this data at the end of Chapters 3, in each competency profile, the students' analytical skills are plotted on the top axis, the interpersonal skills are plotted on the upper right axis, the students' ability to execute is

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plotted on the lower right axis, information processing skills are plotted on the lower left axis and the capacity for change is plotted on the upper left axis (see Figure 3.29 on 86). This key will be provided with each of the data sets below for reference.

Some of the competency profiles presented below have been included in other places in this dissertation. I have reproduced them below for easy reference when analysing the data and presenting summary findings of this case study.

Cycle 1 Competency Profile Maps

During Cycle 1, I generated 6 rubrics for each student. This was done by observing lessons 4 to 9 of Cycle 1. Lessons 1, 2 and 3 had to be excluded because I had not received ethics clearance at this point. These six lessons can be seen in Table 3.1 on page 51. As explained above, each cycle contained different exercises and projects, so the sets of competencies observed in each cycle were slightly different. Figure 7.7 below shows the number and frequency of competencies assessed during Cycle 1. The competency maps that follow in Figure 7.8 represent the development of these specific competencies.
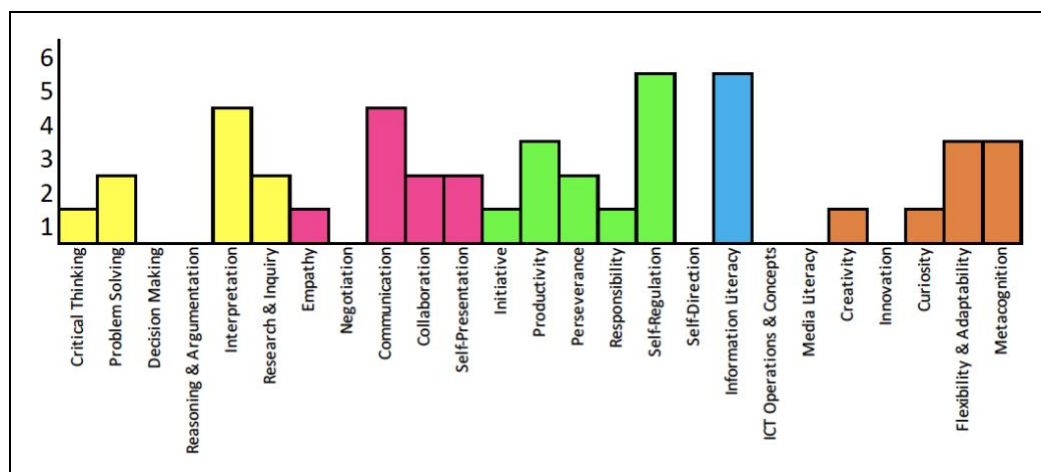
Figure 7.7: Competencies Cbserved During Research Cycle 1

The activities that took place during this cycle included the Elements of Music Treasure Hunt, the Listen and Compare exercise, the Pitch Kahoot and peer tutoring lesson, the Rhythm Clapping games, as well as the Instrumental Karate White Belt assignment. Although many of these lessons were 'non-traditional', requiring students to work in ways they had not worked before, they did not push them too far out of their comfort zones. Observing how the students operated in these lessons allowed me to establish a baseline

competency profile map. These maps can be seen in Fig 7.8 (reproduction of Figure 3.30 on page 87).
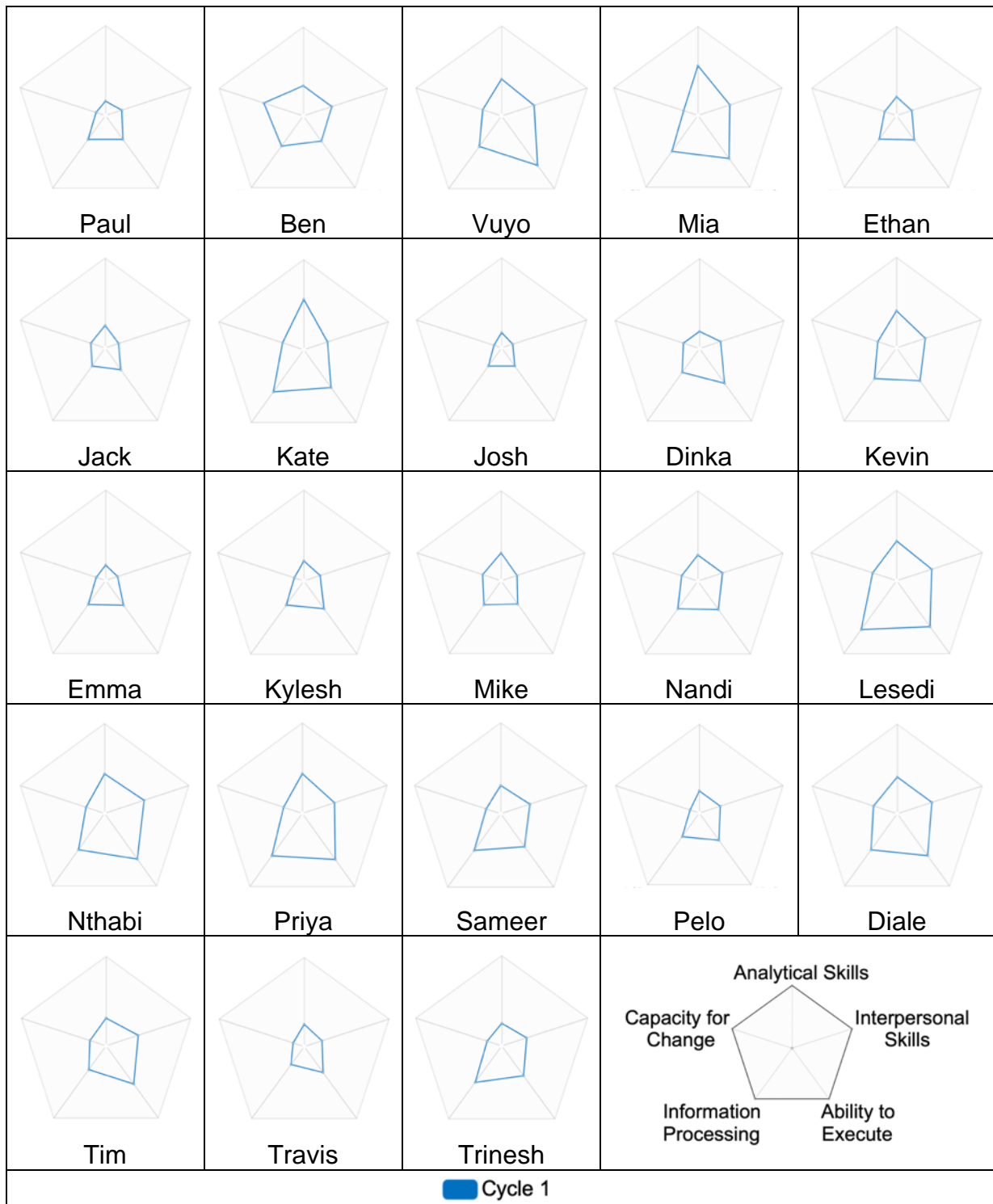
Figure 7.8: Research Cycle 1 Competency Profile Maps

After creating and studying these Cycle 1 competency profile maps, I noted (as I mentioned in Chapter 3) that the more musical experience students already had, the larger their competency profiles were. I was curious to see how these preestablished

competencies would serve the musically experienced students in the following cycles, and whether the 'beginner' music students with larger competency profiles, (like Vuyo, Sameer, Diale and Tim, for example) would be more successful at learning to play a musical instrument than the students with smaller competency profile maps.

Cycle 2 Competency Profile Maps

During the second cycle, students learnt how to classify musical instruments, designed their electrophones, presented their designs to the class for feedback, and completed the Yellow Belt Instrumental Karate assignment on their chosen instrument. The observations of this work were recorded on four rubrics which assessed the competencies shown in Figure 7.9.
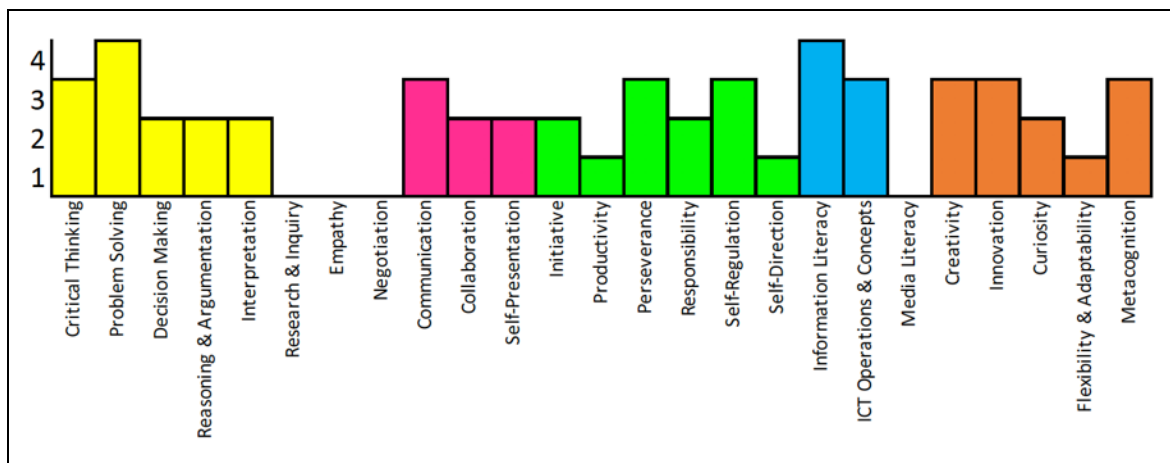
Figure 7.9: Competencies Observed During Research Cycle 2

The students were given much more freedom in this task – a classic inquiry based learning situation with a well-defined task and open ended solutions – than they were used to, and many struggled with the notion of being completely responsible for their own learning. This was reflected in the Cycle 2 competency profile maps shown in Fig 7.10. Cycle 1's maps are indicated in blue, while Cycle 2's are shown in orange so that the changes in competency development can be observed.
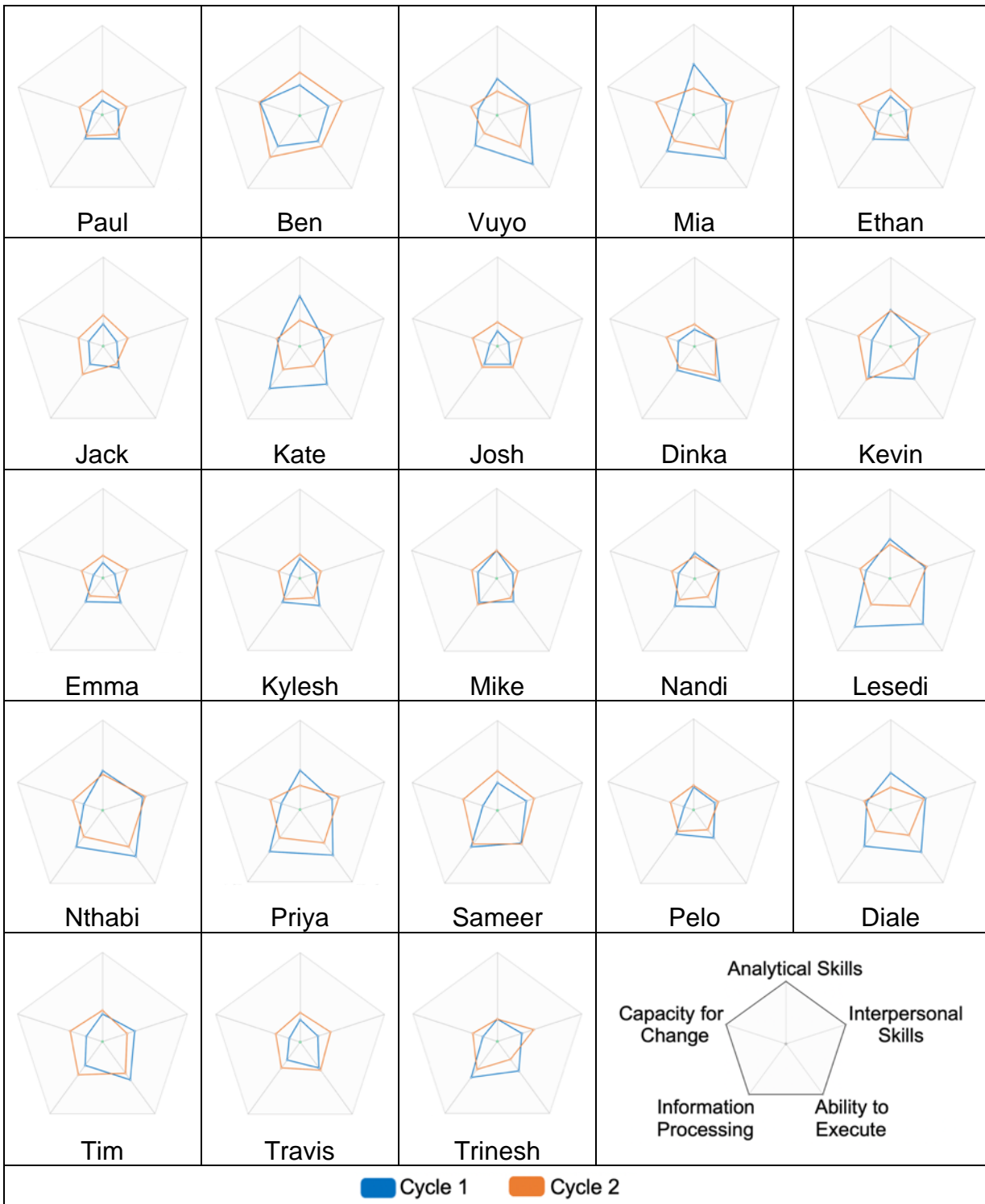
Figure 7.10: Cycle 1 and Cycle 2 Competency Profile Maps

Figure 7.11, below, shows the competency profile map that illustrates the combined competencies of all 23 case study participants.
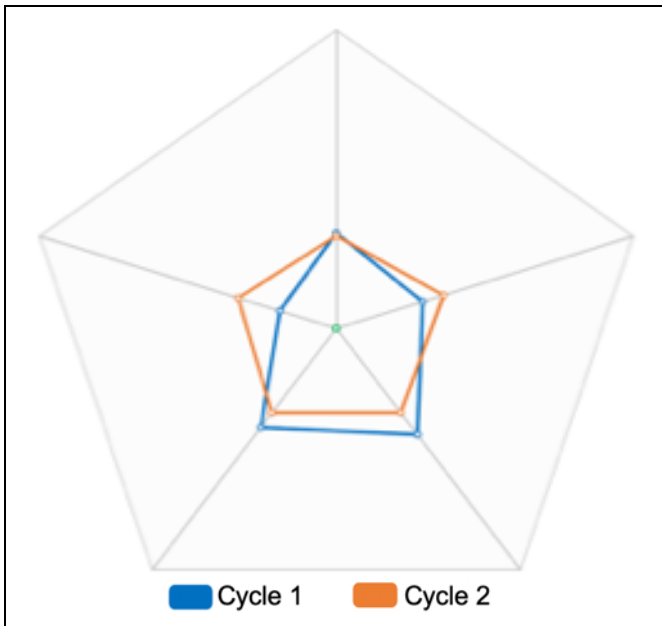
Figure 7.11: Cycle 1 and Cycle 2 Class Average Competency Profile Map

This map shows that there was a negligible difference between the general level of analytical skills in Cycle 1 and Cycle 2, that there was an improvement in the students' capacity for change and interpersonal skills, and that there was a decline in the students' information processing skills and ability to execute.

On an individual level, it was interesting to note that 19 of the 23 students showed a decline in their ability to execute, while only 1 student improved this skill. The remaining four students showed a negligible difference between the profiles for this competency in the two cycles. On the other hand, 20 of the 23 students showed an improvement in their capacity for change, with the remaining three showing a negligible difference rather than a decline between the profiles for this competency in the two cycles. This information, as well as the statistics for the other competencies can be seen in Figure 7.12.
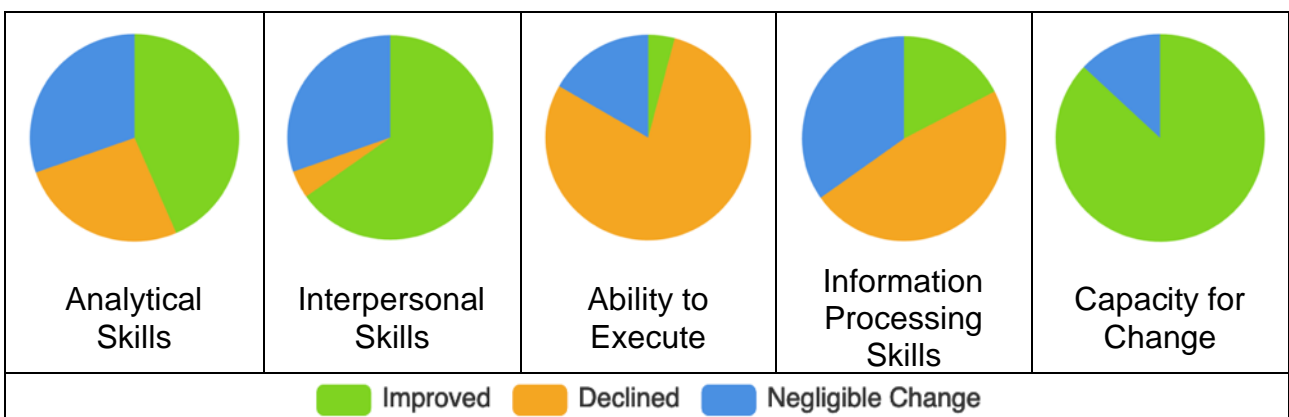
Figure 7.12: Number of Students who Improved, Declined or Stayed the Same between Cycle 1 and Cycle 2

At first, I was concerned to note any decline in skills, in Cycle 2, but after considering the type of work done during this cycle, I realised that it was inevitable, given how much freedom the students were suddenly faced with. Compared to Cycle 1, where students were given explicit instruction, usually broken down into steps that were explained and reiterated throughout the lesson, in Cycle 2 they were given a task and allowed to use their time however they saw fit. They were given the freedom to move around, use their devices, and ultimately take responsibility for their own learning. This level of freedom within the middle school classroom was uncommon and I attributed the slight decline, especially in ability to execute, to the fact that the students found settling into this new way of behaving more difficult to operate within.

Similarly, the students were not accustomed to the amount of information I gave them during Cycle 2, which included instruction sheets, information sheets, competency definitions, and self-assessment rubrics. They had to use this information, too, but were not given explicit instruction on *how* to use it. These struggles that the students encountered during Cycle 2 were challenging, but I came to see them as necessary for the growth of these competencies. It seems that, unless the challenge is set, the competency cannot develop.

The positive improvement in the students' interpersonal skills and capacity for change competencies, on the other hand, could be attributed to the fact that this was their first opportunity to work more intensely with the same group over a prolonged period of time. It gave the opportunity to establish closer bonds and relationships with their fellow group members over a number of lessons. Also, the work done in Cycle 2 provided the opportunity for more creative and innovative work. While I had observed the students' creativity in how they tutored one another during the pitch lesson in Cycle 1, for example, this activity did not inherently demand the same level of creativity as the act of designing an instrument in Cycle 2.

Cycle 3 Competency Profile Maps

The Electrophone Project continued in Cycle 3, which focussed on the construction of the instrument. The competency profiles for this cycle also included the final presentations of the instruments, the Orange and Green Instrumental Karate belts, and two ensemble classes. In total, 19 different competencies were assessed on up to ten rubrics as shown in Figure 7.13 below.

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Figure 7.13: Competencies Observed During Research Cycle 3

The competency profile maps below (Figure 7.14) show the students' Cycle 1 map in blue, the Cycle 2 map in orange and the Cycle 3 maps in green.
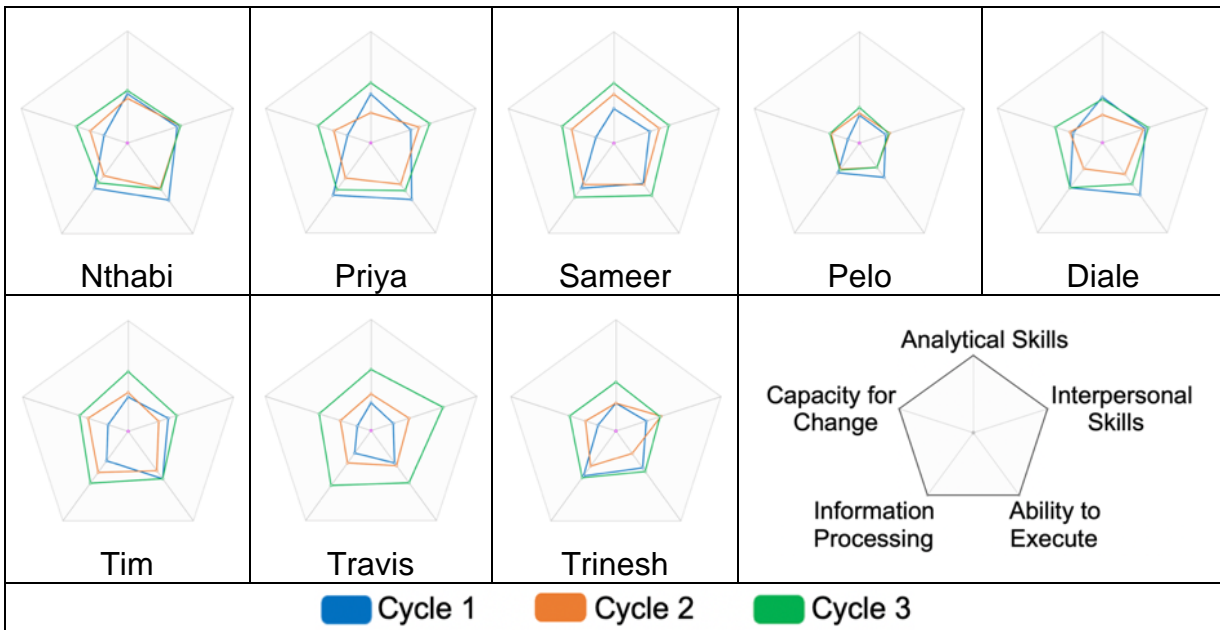
Figure 7.14: Cycle 1, Cycle 2, and Cycle 3 Competency Profile Maps

Figure 7.15 below shows the class average for Cycles 1, 2, and 3 competency profile maps. It shows at a glance, an improvement in each of the competency areas between Cycles 2 and 3. A significant improvement between Cycle 1 and Cycle 3's capacity for change competencies can be seen, but there was a negligible difference between the ability to execute competencies on these two profiles.
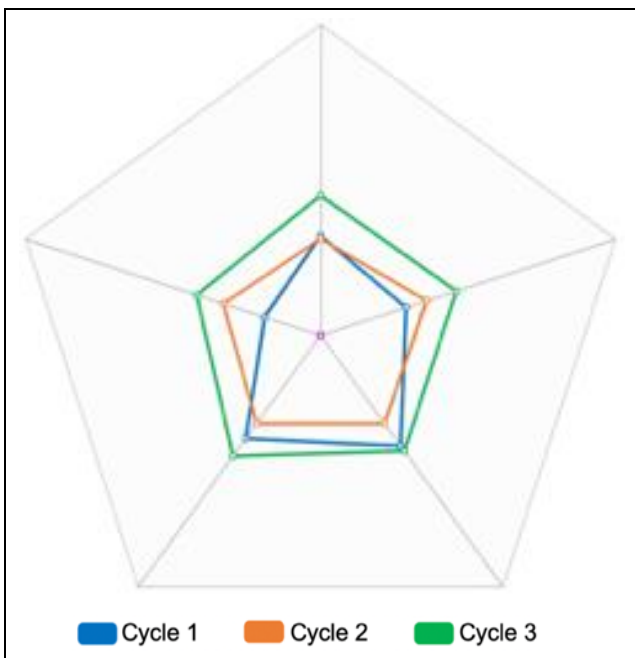
Figure 7.15: Cycle 1, Cycle 2 and Cycle 3 Class Average Competency Profile Maps

On an individual level, only one student showed a decline in one of their competency areas (interpersonal skills) between Cycles 2 and 3. Every other student showed an improvement or stability in their competency profiles (Figure 7.16).
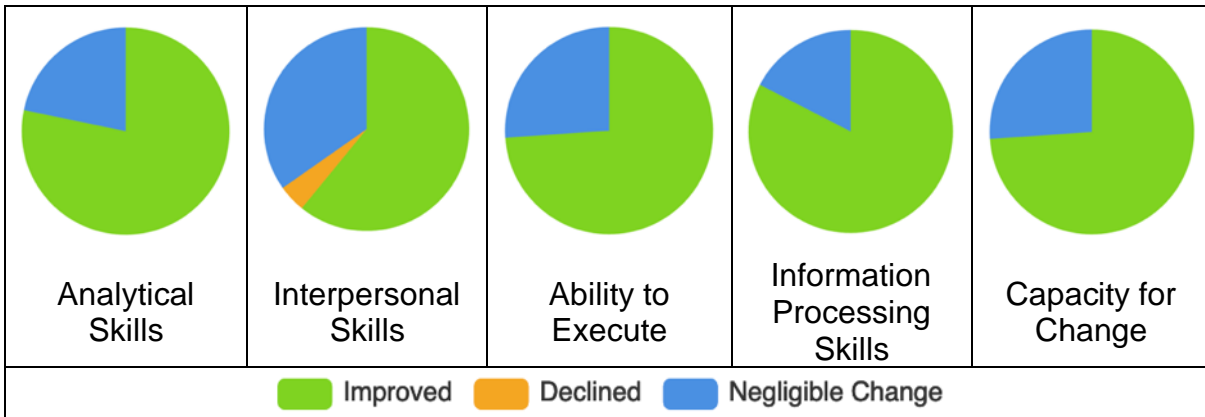
Figure 7.16: Number of Students who Improved, Declined or Stayed the Same Between Cycle 2 and Cycle 3.

When considering the growth that took place between the baseline established in Cycle 1 and Cycle 3, we can see that some students did not manage to achieve the same level of competency in ability to execute and information processing, that they had in Cycle 1. On the other hand, a significant number of students showed an improvement in analytical and interpersonal skills, and every student showed an improvement in their capacity for change competencies.
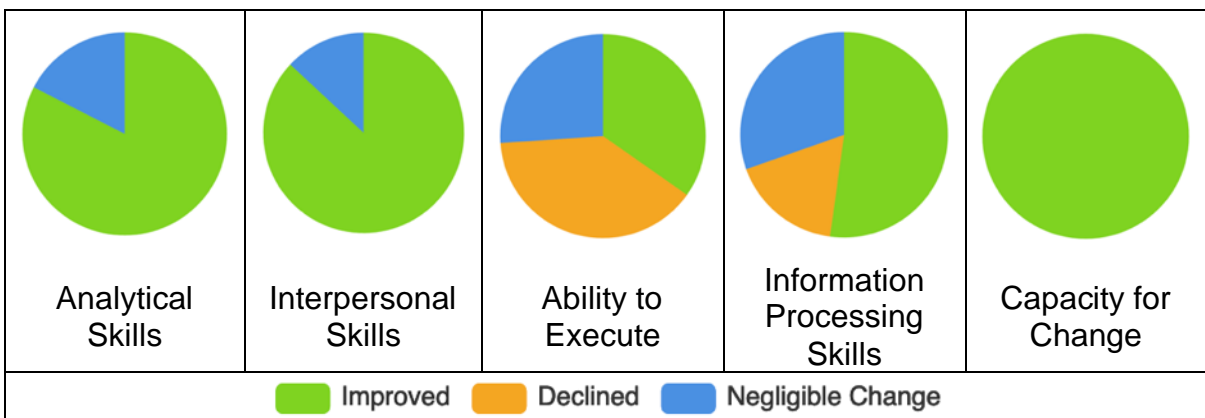
Figure 7.17: Number of students who Improved, Declined or Stayed the Same Between Cycle 1 (Baseline) and Cycle 3 (Construction).

As I mentioned when discussing the changes in competency levels between Cycle 1 and Cycle 2, the type of work that was required during Cycles 2 and 3 was not only more challenging, but also unprecedented in terms of the levels of freedom and responsibility the students were given.

By comparing the competency profiles of Cycles 1, 2 and 3, we can see that during Cycle 3, students became more comfortable with the type of work that was expected of them. It remained challenging, however, and some of them were not able to operate at the same level of competency as they had in Cycle 1, particularly in the areas of ability to execute and information processing.

The project-based nature of Cycles 2 and 3 also played a role, providing students with many more opportunities to be creative, collaborate with their peers, and critically assess their work than traditional teaching methods would, I argue. The opportunities to hone these skills in every lesson, over an extended period of time, resulted in a significant improvement in each of these areas.

Cycle 4 Competency Profile Maps

During Cycle 4, the students revisited the elements of music through two introductory exercises, worked on a copyright court cases project, participated in two ensemble classes, and competed their Purple Instrumental Karate belt on their chosen instrument. The competency development observed during this cycle was recorded on eight rubrics which assessed the competencies shown in Figure 7.18.
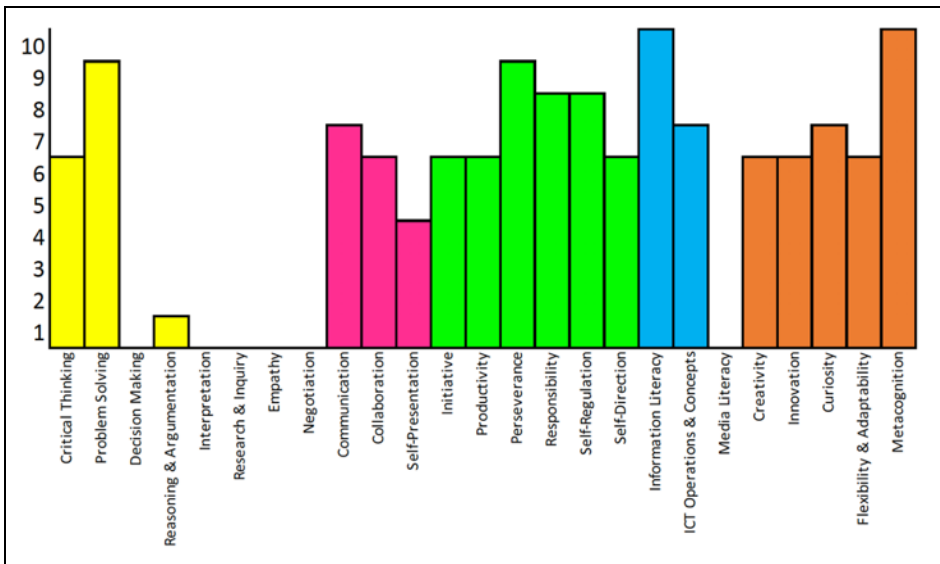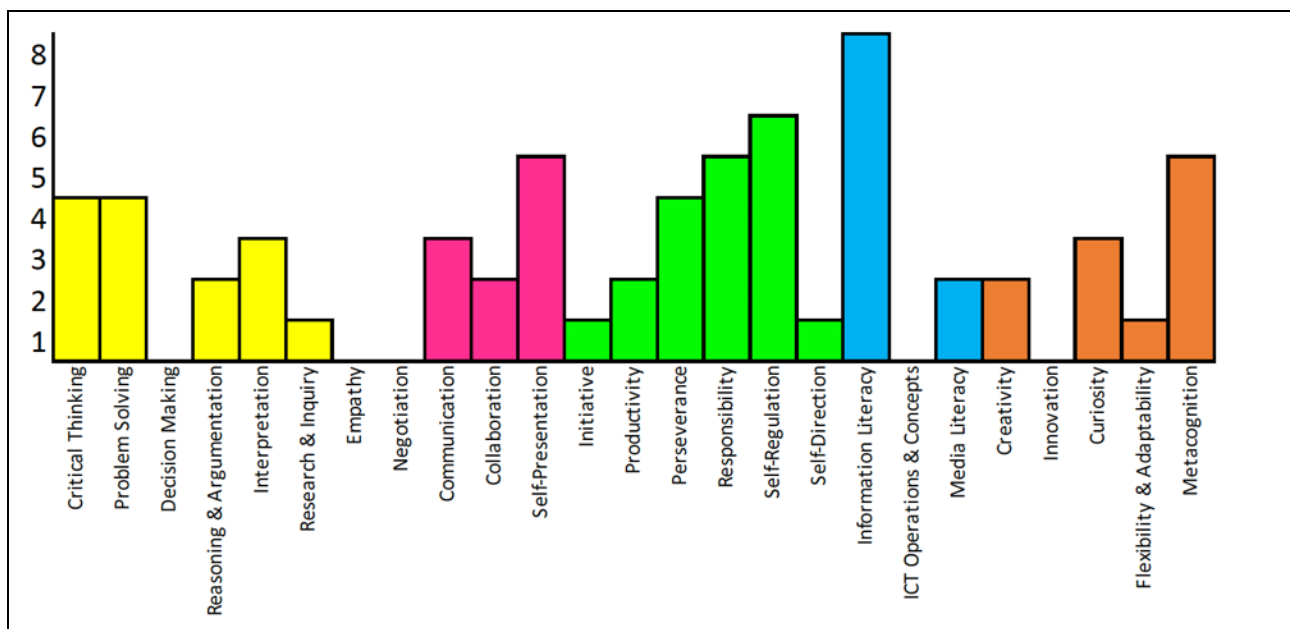

Figure 7.18: Competencies Observed During Research Cycle 4

The competency profile maps below (Figure 7.19) show the data collected in Cycle 1, Cycle 2, Cycle 3 and Cycle 4.

Figure 7.19: Cycle 1 (Baseline), Cycle 2 (Design), Cycle 3 (Construction) and Cycle 4 (Court Case) Competency Maps

Despite the mixed results achieved by different groups of students, the class as a whole showed an improvement in every competency area, as shown in Figure 7.20.
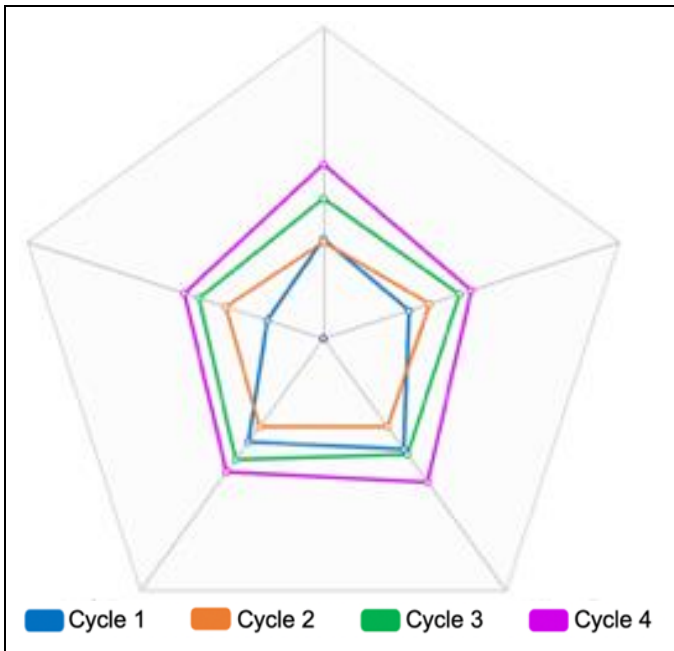
Figure 7.20: Cycle 1, Cycle 2, Cycle 3 and Cycle 4 Class Average Competency Profile Maps

The most notable change was in ability to execute. In the preceding cycles, some students failed to surpass the standard that they set in the baseline observations in Cycle 1, but by Cycle 4 many of them were showing a significant improvement in this area for the first time.

On an individual level, development between Cycle 3 and Cycle 4 (as seen in Figure 7.21, below) was quite varied. While the majority of students did exhibit an improvement in their interpersonal skills, ability to execute, and capacity for change, a few students showed a slight decline in all five competency areas.
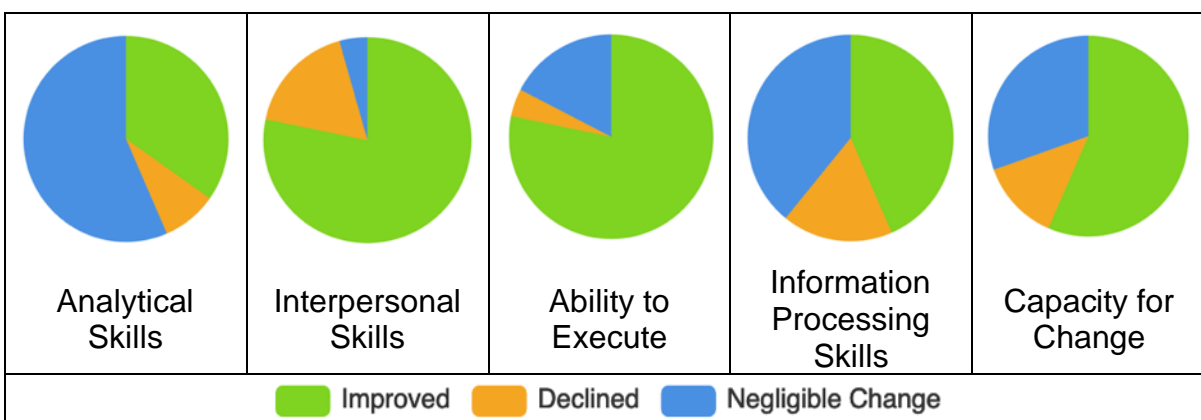
Figure 7.21: Number of students who Improved, Declined or Stayed the Same Between Cycle 3 and Cycle 4

If we are to consider their development from Cycle 1 to Cycle 4 (Figure 7.22), however, we can see that every student's interpersonal skills and capacity for change competencies

improved. Their analytical skills, information processing skills, and ability to execute competencies either improved, or stayed the same, with just one student showing a slight decline in information processing skills.
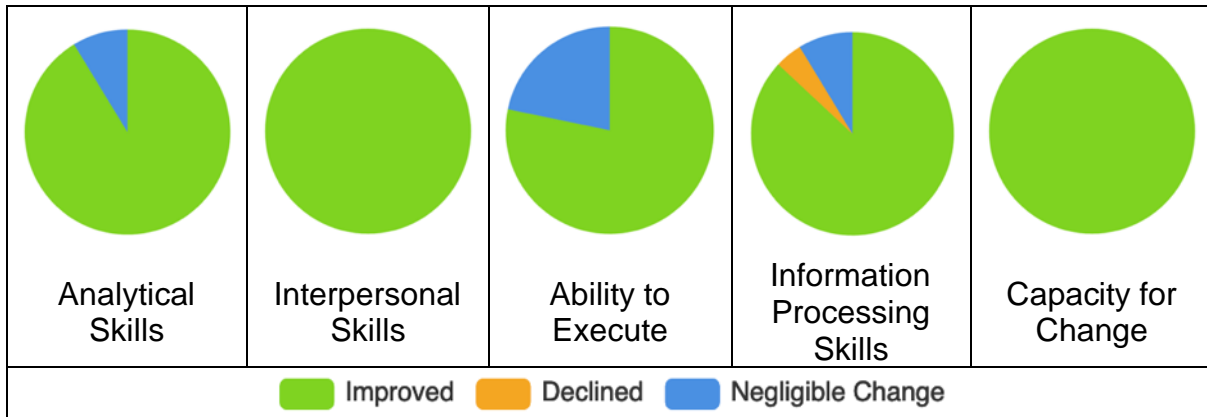
Figure 7.22: Number of students who Improved, Declined or Stayed the Same Between Cycle 1 and Cycle 4

The kind of work done during Cycle 4 was, once again, different from students' previous experience and even what they had done in the preceding cycles. It more closely resembled a traditional classroom setting, but far greater importance was placed on theoretical content and concept knowledge in the copyright court case. The differently constructed groups had to learn to work together, too, but the greater degree of overall structure within the classroom, I suggest, had an impact on competency development in this cycle.

Students with prior musical experience showed greater improvement in Cycle 4 than those without. These musically experienced students – who were also grouped together – were generally more comfortable with the musical content taught during the course, and I attribute their greater competency development to their confidence with the material they were dealing with in the court case. On the other hand, the more equal pairing up of students with similar competency maps in the court case project (see page 162) forced those students who had shown less growth up to this point, to take more responsibility: there were no 'stronger students' to fall back on and hide behind. It was this factor, I think, coupled with the more structured setting of the Cycle 4 project, that allowed these students to improve their competencies in the fourth cycle. Finally, the greater sense of structure may also have been responsible for a general improvement in all students' ability to execute competencies.

Formal Assessment Competency Profile Maps

I decided to separate the data collected during the Formal Assessments (class test and examination) from the rest of the assessments, as the students' attitude towards this work was remarkably different than their attitude towards the general classwork that had been observed during the rest of the case study. Although it did not constitute a 'cycle' as such and was short, I felt that it would nevertheless be worthwhile analysing this data separately to see how labelling a task as a 'test' or 'exam' impacted on the competencies displayed. In addition, I did not want to skew data collected in the last cycle by including formal assessments in it, when they had not been part of the other cycles. Figure 7.23 shows which competencies I observed during these formal assessments.
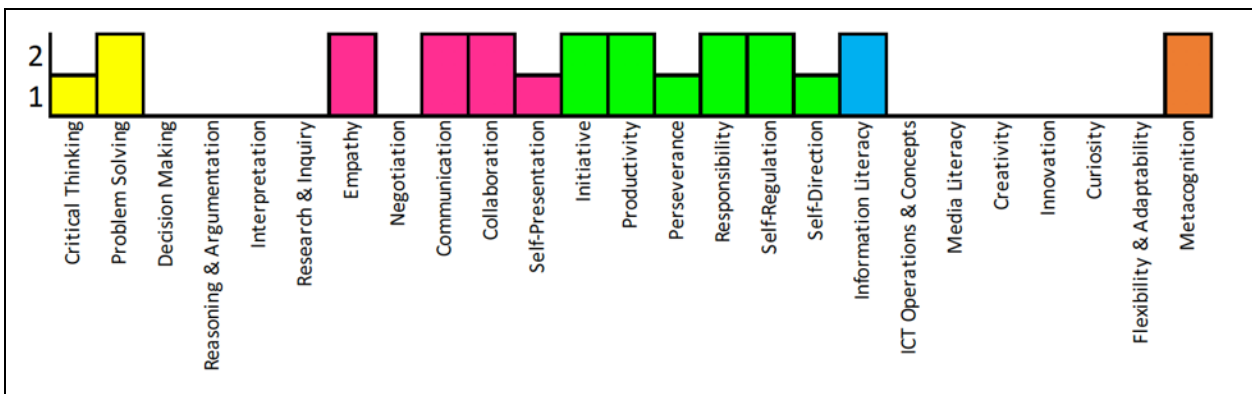
Figure 7.23: Competencies Observed During Formal Assessments

The competency profile maps in Figure 7.24 show how each student in the case study progressed throughout the study and particularly during the formal assessments (shown in purple).
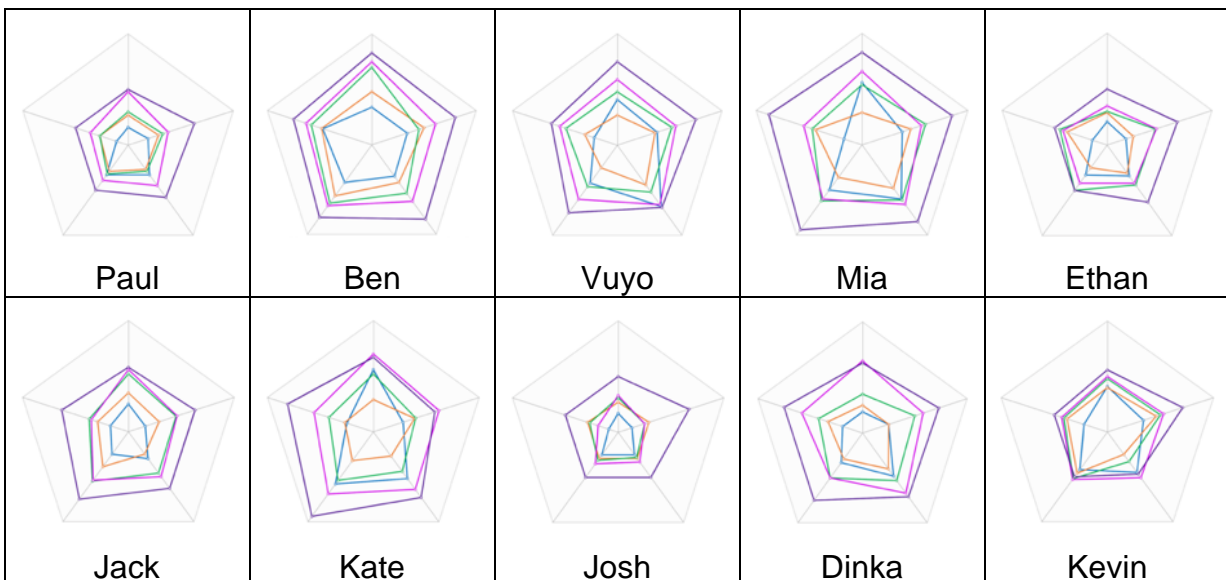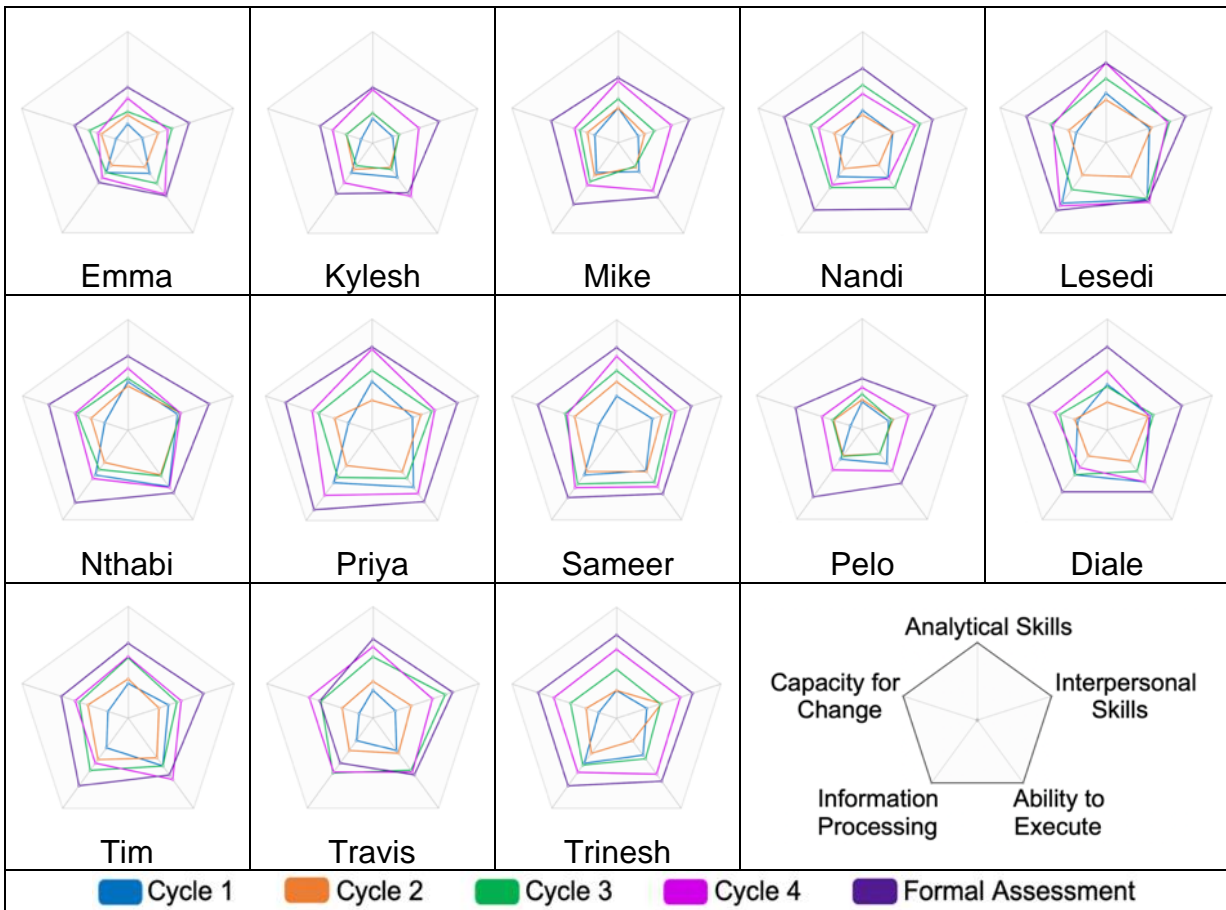
Figure 7.24: Cycle 1 (Baseline), Cycle 2 (Design), Cycle 3 (Construction), Cycle 4 (Court Case) and Formal Assessment (Student Driven Ensemble Performances) Competency Profile Maps

On average, an improvement was shown in each of the five competency areas between Cycle 4 and the Formal Assessments. The most notable improvements were in capacity for change, information processing, and interpersonal skills, as seen in Figure 7.25.
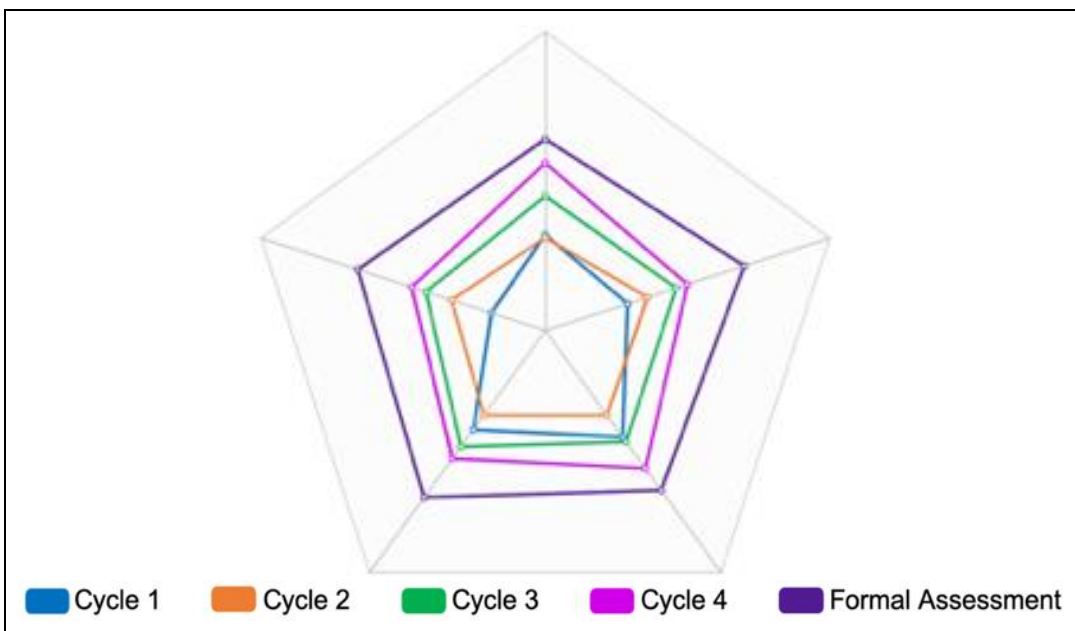
Figure 7.25: Cycle 1, Cycle 2, Cycle 3, Cycle 4 and Formal Assessment Class Average Competency Profile Maps

Figure 7.26 below shows that, individually, the majority of students' competency profile maps improved between Cycle 4 and the Formal Assessments, with a few remaining the same and just one student showing a decline in three of the five competency areas. Every student showed an improvement between their Cycle 1 and Formal Assessment competency profiles in four of the five competency areas (Figure 7.27). Just three students' ability to execute profiles remained unchanged between the first and last competency profiles maps of this study.
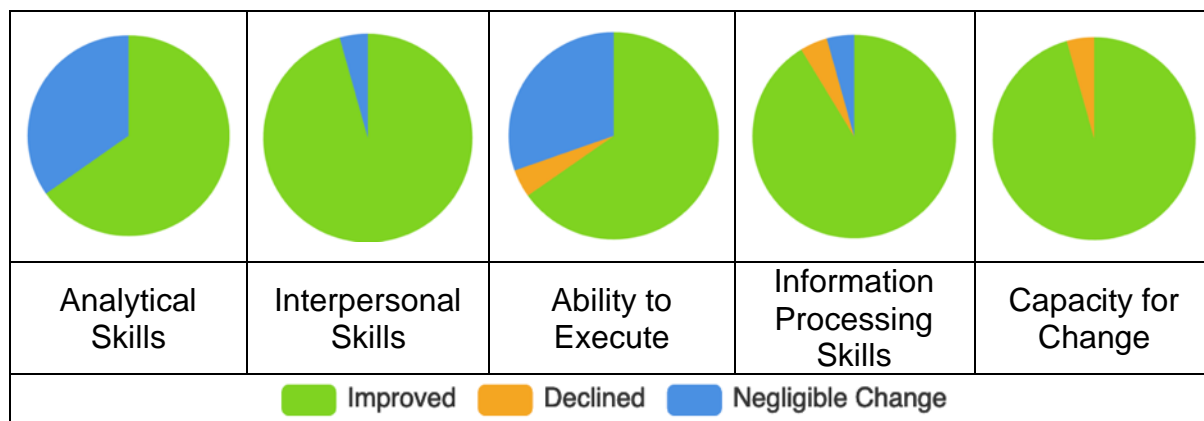
Figure 7.26: Number of Students who Improved, Declined or Stayed the Same Between Cycle 4 and the Formal Assessments
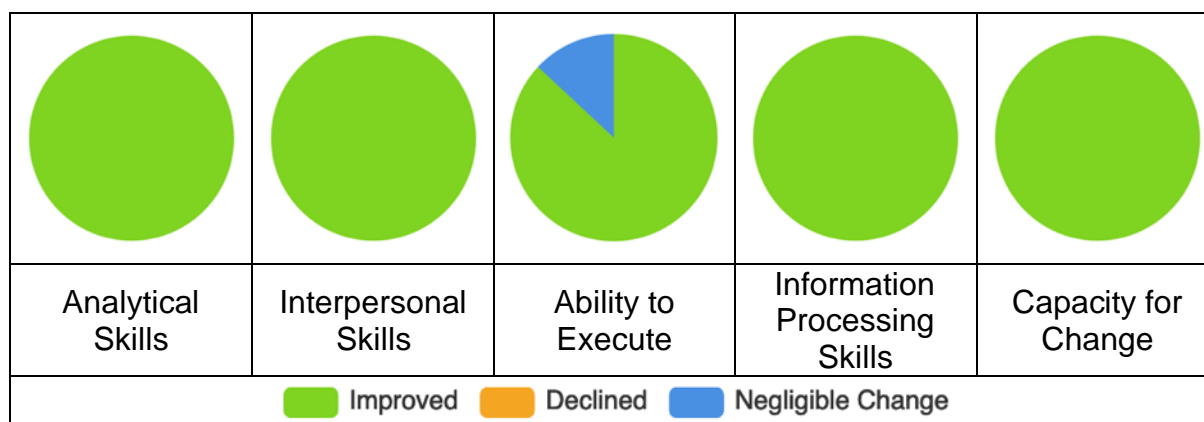
Figure 7.27: Number of Students who Improved, Declined or Stayed the Same Between Cycle 1 and the Formal Assessments

As I mentioned when describing the students' attitudes towards their Formal Assessments in Chapter 5, the students approached their class test and exam with unprecedented rigour and focus. Whether it was due to the framing of these tasks as 'test' and 'examination', and the school-wide expectations attached to these types of assessments or to other factors, would need further investigation. My initial impression is that, if it is going on a report as a mark (and therefore going home to parents) the students tend to take it more seriously. This indicates a somewhat underdeveloped 'locus of control', which appears to rely on the external 'policeman' of the teacher's assessment, rather than the

internal locus of self-directed learning, no matter what the assessment may reap, it is clear that Final Assessments galvanised students, in any case, enabling most of them to show an overwhelming improvement in their competency profile.

Developing 21st-century Competencies through Music

This study aimed to explore how 21CCs could be developed through music and, as the title indicates, through the music curriculum afforded by a middle school age-group in a private school in Johannesburg, South Africa. Leaving aside the context, for now, it became obvious to me during this research – if I did not know it already – that 'music', in the context of this study, is a word that refers to many things: a classroom learning environment, a curriculum, a practice hard won individually and not all that easy to manage collectively, a knowledge base with its own unique terminology and concepts, and a sonic phenomenon that people relate to in unique and varied ways. It is a word sometimes used, both in South Africa and elsewhere, without much thought: to people who love orchestral concerts, it means the western orchestral repertoire; to people who enjoy clubbing, it means electronic dance music; to some teenagers in my Grade 7 class, it means pop songs; to people who sing in choirs, it means choral music. In most traditional contexts in southern Africa there is no indigenous word for 'music' that does not also imply dancing, or at least movement, as well as lyrics. Indeed, the isiXhosa, Sesotho, or isiZulu words for the activity that my research refers to as 'music' is often synonymous with 'song'. There is a huge chasm, then, between what most of my students experienced previously as 'music' – playing an instrument for grade exams – and what many other people in South Africa understand by this word.

It is clearly impossible in one case study, in one classroom conducted over 33 hours between February and November 2019, to bridge the many gaps that exist in different understandings of 'music' and even to foster the notion that it is many things to many different people. Besides, that was not the main aim of this research. Nevertheless, each of these aspects the word 'music' refers to, that I enumerated in the previous paragraph (leaning environment, curriculum, practice, etc.), were important contributors to the competency development that took place during this study. I now explore more fully some of my findings about competency development through music, that provide possible answers to the five research questions that I identified in Chapter 1.

I identified 27 competencies under five broad headings, shown in Table 7.2 below.

Analytical Skills	Interpersonal Skills	Ability to Execute	Information Processing	Capacity for Change
Critical Thinking Problem Solving Decision Making Reasoning & Argumentation Interpretation Research & Inquiry	Communication Collaboration Empathy Negotiation Self-Presentation	Initiative Self-Direction Productivity Perseverance Responsibility Grit Self-Regulation	Information Literacy Media Literacy Digital Citizenship ICT Operations & Concepts	Creativity Innovation Flexibility & Adaptability Metacognition Curiosity

Table 7.2: 21st-century Competency Framework

As I explained in Chapter 2 (see page 46), however, I had to exclude some of the planned projects and exercises, owing to the reduced number of lessons. It is mainly for this reason that some of the competencies were not explored, or not explored as fully as I hoped. Digital citizenship was one such competency. I had planned to develop it through a 'music elements website design project' (see Table 2.8 on page 42), which unfortunately fell away due to insufficient time.

I had identified 'grit' as another competency that I wanted to explore, under ability to execute. The improvements in perseverance, initiative and responsibility that I noted during the course of the study are indicators of grit, to be sure, but if one defines grit as passion and perseverance for long-term goals (Duckworth 2016), then it was not sufficiently conducive to the rubric-based assessments that observed competencies within specific moments. When looking at this project in its entirety and considering the students' growth, the students certainly showed some grit, but, I was unable to quantify this through the tools used in this case study.

I now explore competency development through music in the five broad competency areas.

Analytical Skills

The analytical skills that appear to have been most readily developed through music were critical thinking and problem solving. I attribute this to several factors. As Figure 7.25 on page 213 shows, once the students began constructing their instruments, the numerous challenges they encountered created the conditions for them to hone their critical thinking and problem-solving skills. The improvement in these competencies between Cycles 2 and 3 was particularly evident, but even the slight improvements seen in Cycle 4 and the Formal Assessments, were significant. The activities students engaged in, in these final weeks, did not provide that same level or kind of challenge that instrument building provided, but students continued to demonstrate and develop their analytical competencies in appropriate situations. It appears evident that the problem-based nature of project-based learning, which was emphasised in Cycle 3, also played a significant role: it was not simply 'music', in other words but a musical *project* that mattered, here. Decision making, reasoning and argumentation, interpretation, and research and inquiry were also explored in many different ways – for example in the musical elements lessons and in the court case, the sonic aspect of music was the medium through which proof and evidence were led – but they remained less well developed as competencies than problem solving and critical thinking.

Learning to play an instrument through the Instrument Karate Programme, was another pedagogical model that assisted in the development of these competencies, particularly problem solving. Students were required to work through complex procedures with (mainly) online assistance – unusual (before Covid-19) compared to conventional school instrumental study – and they had to identify what they were doing wrong and change their behaviour, with minimal help from me, in order to produce the desired result.

Self-assessment and the self-awareness of competency development, that I introduced right from the beginning, and constantly reminded students about, were two other important factors enhancing students' competencies in the broad area of analytical skills. Self-assessment was used as both a reporting and a teaching tool as shown in Chapters 3 to 6. I had not anticipated, however, that these self-assessments would provide me with such valuable insights into the students' analytical skill development. The difference between the Cycle 2 and Cycle 3 self-assessments, for example, mirror the significant improvement I noted through my rubric based observations. Figure 7.28 shows the competency profile maps derived from my Cycle 2 rubric-based observations, in orange,

and those derived from the students' self-assessment, in blue. Figure 7.29 shows the same data for Cycle 3 with my assessments shown in green and the students' self-assessment shown in blue. These figures were originally presented in Chapters 4 and 5 when discussing self-assessment.
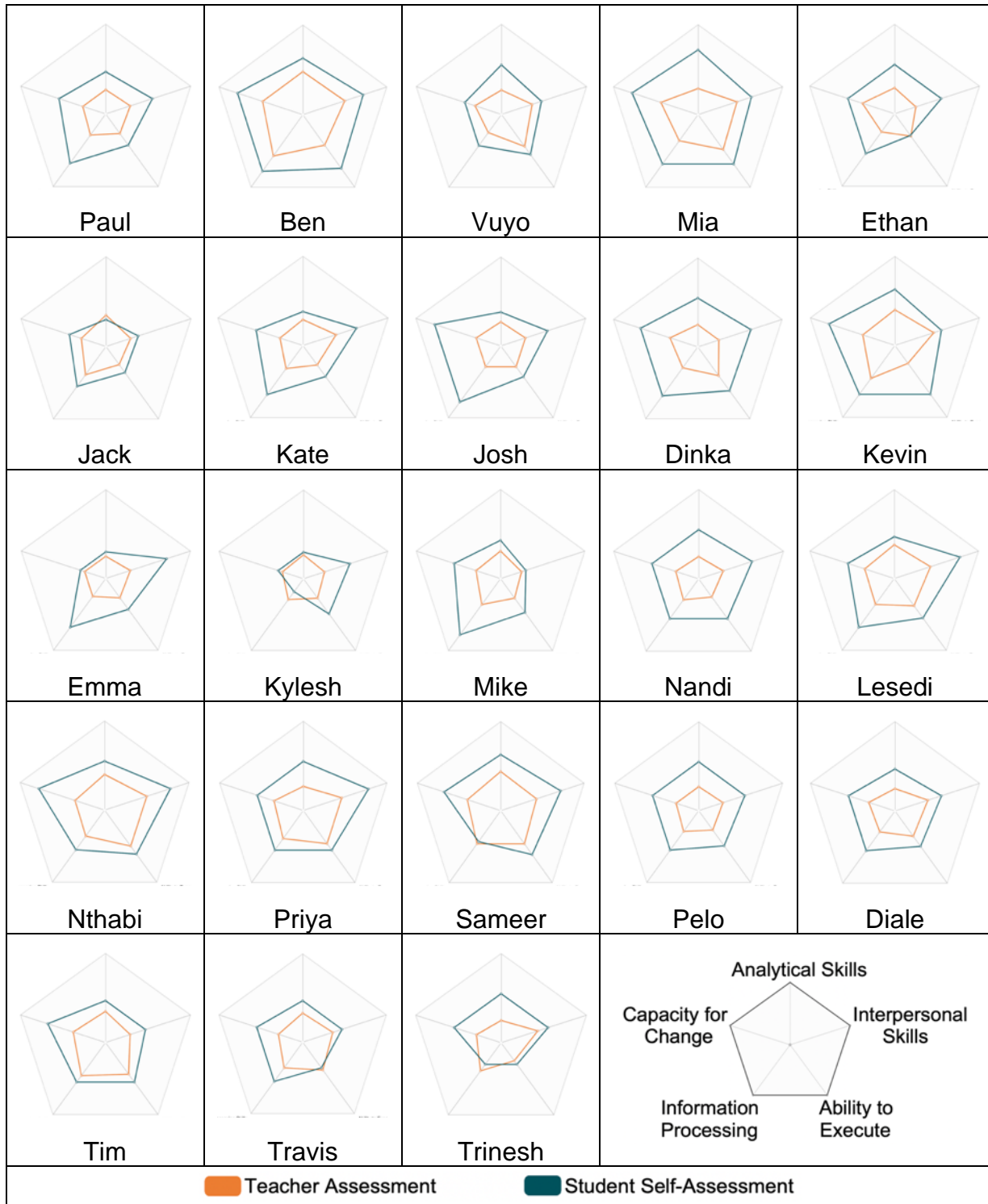
Figure 7.28: Cycle 2 Teacher and Student Assessment Competency Maps.
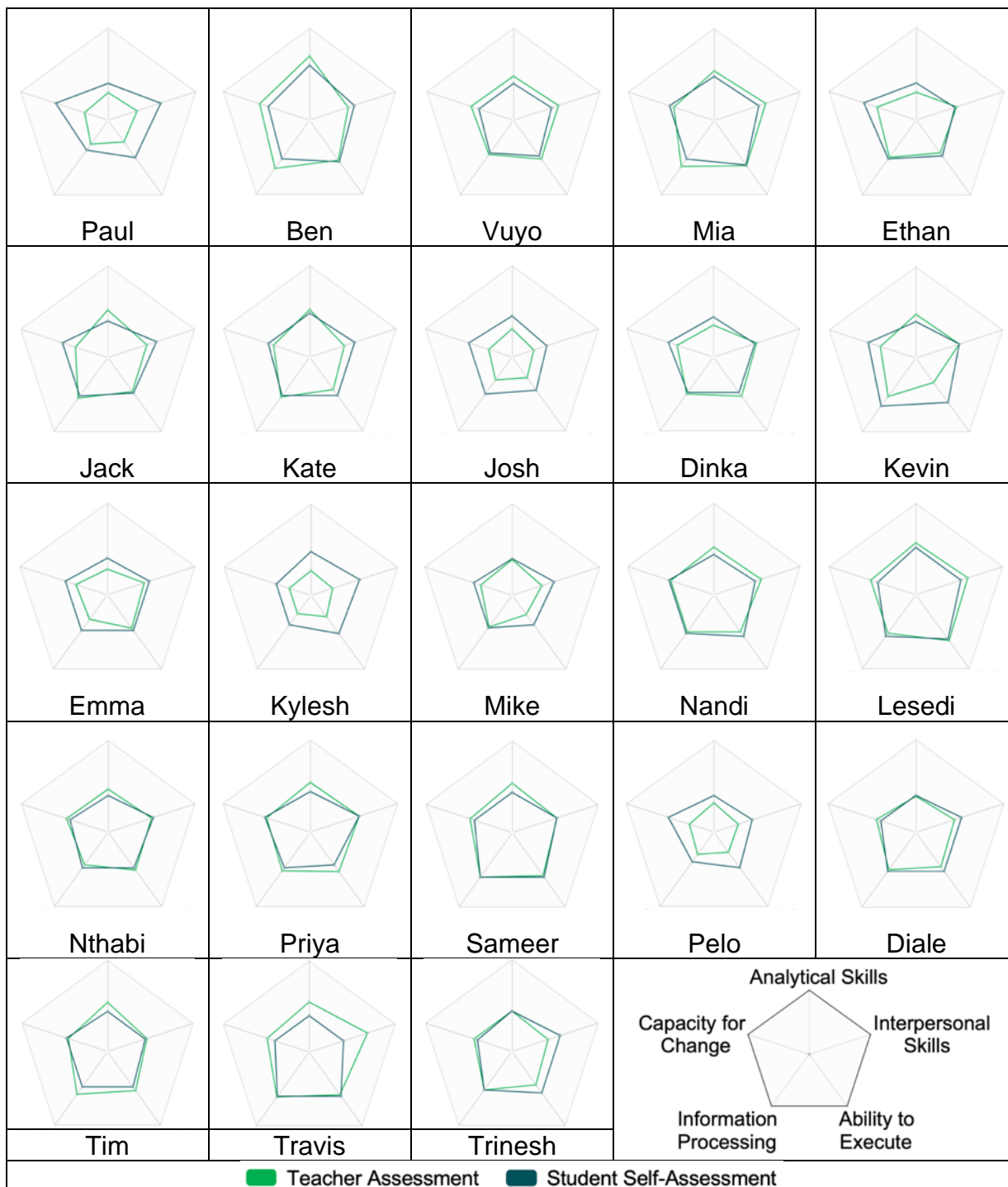
Figure 7.29: Cycle 3 Teacher Assessment and Students' Self-Assessment Competency Profiles

As you can see from Figures 7.28 and 7.29, the students' self-assessment accuracy was substantially better during Cycle 3. Figures 7.30 and 7.31 below shows the number of students who overestimated their ability in orange, those who underestimated their ability in blue and those who accurately assessed their ability in green. I allowed for a 15 point (roughly 10%) margin of error when calculating the statistics depicted in these graphs. As

you can see, during Cycle 2, very few student were able to produce accurate self-assessments, and most students overestimated their ability.
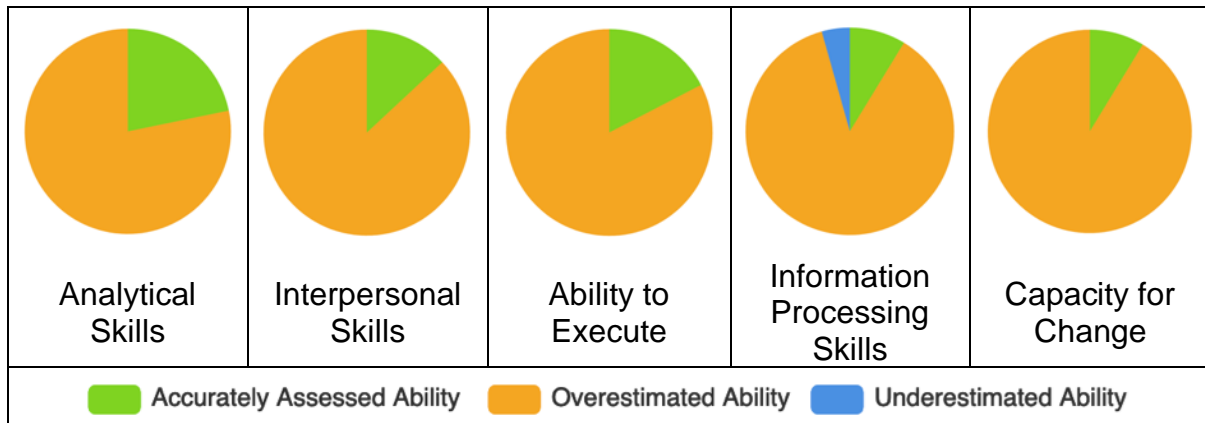
Figure 7.30: Number of Students who Accurately Completed Self-assessments in Cycle 2.

In Cycle 3, however, far more students were able to accurately assess their own ability.
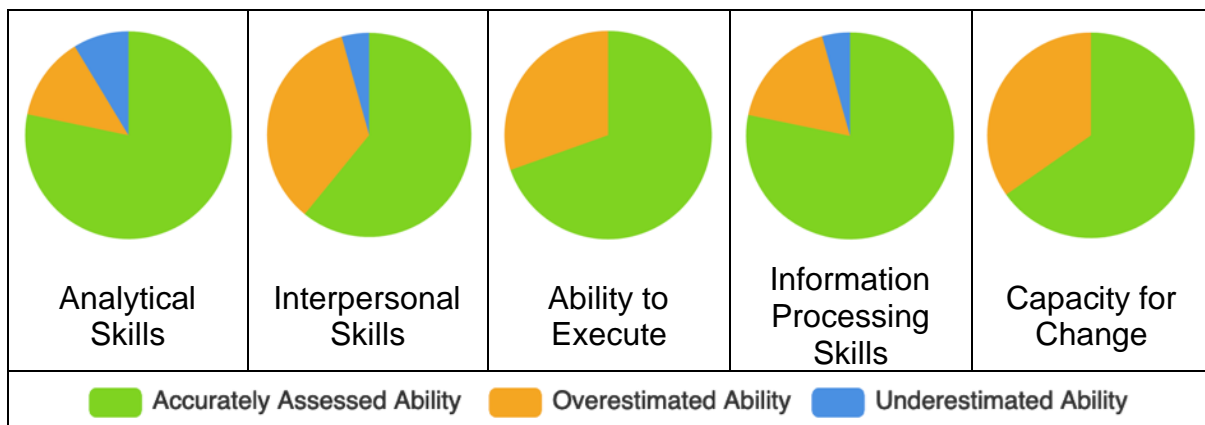
Figure 7.31: Number of Students who Accurately Completed Self-assessments in Cycle 3.

From the competency profile maps shown in Figures 7.28 and 7.29, it can be seen that the students with less developed profiles (represented by smaller maps) were less accurate in their self-assessments. This can be clearly seen in the cases of Paul, Josh, Kylesh and Pelo. The ability to assess one's own competencies accurately is, in turn, a competency in itself, and it is not only a useful one for anyone but vital for a performing musician. Indeed, the entire system of teaching and examining of individual practical work on any western instrument (including vocal studies), depends absolutely on a person's ability to see where their weaknesses are, to reflect on them, and to work hard to improve those areas. This is why practice is such a repetitive, time-consuming activity. Each individual musician is constantly working for their own improvement, which is why, in performance, there is never any sense of being 'good enough': whether you are a complete beginner or a famous virtuoso, you are always trying to improve. Perhaps I could go so far as to say that the

students with underdeveloped analytical skills in comparison to their classmates, in this project, may have more difficulty with practical music until they are able to recognise this shortfall in themselves.

During the focus groups, several students noted that the analytical skills that they developed during the music class could be transferred to other learning areas. Jack noted how the ability to accurately analyse his own capabilities could be useful.

> Well… it's good to judge yourself in different ways, 'cause you know, usually when you get rubrics, it's just your teacher marking it and saying you did this, and this, and this… but it's good… if you've got a speech you need to do…. And then you can say it before you do the actual thing, like as a practice… and then be able to rate how well you did… to improve it (Term 2 Focus Group, 1 August 2019).

Nthabi and Mia also noted that they were able to transfer this skill into other areas of their lives:

> Well, like analysing things… 'cause what would happen with me is like in a lot of my tests I'd work fast and make a lot of silly mistakes… so, definitely going back, and not going back to look just so you can say you're done, so you can actually look at the questions. Did I spell this right? Is there a comma and a full stop in the right place? Is that sum correct? You know, it's helped a lot. And also with critical thinking, 'cause like… you have an idea off the top of your head and you think okay let's go with it… but when you really think… is it smart? Am I going to be able to get the parts to do this? Am I going to be able to do it in the time I have? You know… all those things (Nthabi, Term 3 Focus Group, 24 October).

> I think my critical and my analytical skills have gotten much better over the year… I've gotten more detailed in my work… and I think logically about all my choices (Mia, Term 3 Focus Group, 24 October).

Interpersonal Skills

The interpersonal skills competency area, along with the capacity for change competency area, showed the most significant growth out of the five broad areas, during the case study. An improvement in this competency area was noted within the first few lessons of Cycle 1 (see page 88) and developed consistently throughout the case study. The sub-competencies that were most easily observed within this broad area were communication, collaboration and self-presentation. All three characterise music as a performing discipline. Apart from the Instrument Karate activities, when students were working on their own individual progress, they rarely worked alone during this case study. It was not simply

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'music' in the abstract, but the focus on collaborative work in order to create a musical instrument, or argue for the similarity between one piece of music and another that furthered these skills. The opportunity to work with various groups for prolonged periods of time might be present in any school classroom, as could the modelling of collaborative structures (think-pair-share and jigsaw), the teacher's intentional construction of homogeneous and heterogeneous groups, and the gamification of group activities. The varied aspects of music, however, offer the scope for multiple types of communication and collaboration to be developed. The interactive, participatory nature of playing in an ensemble requires the students to learn how to communicate through, and respond to, various nonverbal cues, such as gestures and eye contact. Active listening, in this context, also became an essential skill the students needed to hone. Learning to play in time and in tune with their section and the larger ensemble, navigating self-directed rehearsal processes, and working alongside peers with drastically different levels of ability (ranging from complete novice to Grade 8[12] level), all forced students to develop more complex and nuanced communication and collaboration skills, skills that would not necessarily be offered by other subjects like physics, mathematics, or biology.

Something else contributing to the development of interpersonal competencies was peer-based feedback. From the Pitch Kahoot peer-tutoring exercise to the instrument design feedback sessions, students commented time and time again on the value of feedback constructed and delivered by their peers. These realisations in turn motivated the students to develop their interpersonal skills. This was also clear from the rubric-based data I collected and in the focus groups where students commented:

> At the beginning of the year, I couldn't really work in groups. But then in music, basically every project we had to work in groups, and I've learnt to work better in groups. Like the instrument that we made. In the beginning I didn't really know what to do, and then I started getting used to working in groups, now with the newest project, I'm learning to basically be with different types of people (Mike, Term 3 Focus Group, 24 October 2019).

> For me, I learned how to collaborate with different people, 'cause usually in class we get to choose our groups, but I like how you put us into groups, so that we can collaborate with different people, that we wouldn't go to as our first choice (Vuyo, Term 2 Focus Group, 1 August 2019).

> I used to hate group work. I used to think I was the leader of everything and boss people around a lot… and make people cry… so… I'm not proud of that… so…

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[12] For reference, students who take music throughout their high schooling are expected to perform at a Grade 5 level in their final year of high school. Some students in this class, who were in their first year of middle school, were already playing at Grade 5, 6, 7 or 8 level.

after doing group work quite a lot… and music is one of the main things that has got me to like group work a lot more… its' taught me a lot… it's taught me to deal with it… and to prepare… for the future… and yes… so group work was one of my favourites to do (Sameer, Term 2 Focus Group, 1 August 2019).

So, something you do continuously build when you do group projects, I guess is how to be patient, and how to understand them. They are trying, so you need to calm down, if you're feeling a bit aggravated or angry or upset. 'Cause I don't think a lot of us like working in groups, mostly because I think most of us are really strong minded and you kind of want to be in control… at least that's my problem… and then when I'm paired with… let's say Kate, not to say that's she bad or anything, it's just that she's also really strong minded so we kind of bash… because we're both fighting for that dominance. So this group work actually kind of helped me calm myself a little, and it teaches me like… you know… you need to learn to step back and let other people do it. Not always try to be in control (Nthabi, Term 1 Focus Group, 28 March 2019).

Only one student made explicit mention of the transferability of their interpersonal skills during the focus groups, when Mike commented, "In English I've got much better at communicating with people. And in Afrikaans dialogues, it's much easier to get my opinion across" (Term 3 Focus Group 24 October 2019). I noted that these skills were highly transferable within the music class, however, and that they began developing early on in the case study. Students easily transferred and adapted the skills they had developed, as they moved into different groups and projects. Nowhere was this more evident than in the Formal Assessments, where students engaged with one another in an ensemble setting. In most cases, students demonstrated 'proficient' or 'exemplary' interpersonal skills. I saw the negotiation of which method should be used to conduct the rehearsal, the care with which the more experienced students guided the less experienced students, the active listening that allowed the students to play in time and (in most cases) in tune with one another, the conversations around aspects of the performance that required additional rehearsal, and the non-verbal gestures that the students used to help one another navigate the performance, as evidence that the students had absorbed and were able to implement each of the interpersonal competencies that had been developed throughout the study.

Ability to Execute

The ability to execute competency area was the most assessed (see Figure 7.1 on page 195), but showed the least growth during the case study, with real development only noted in Cycle 4 (see Figure 7.25 on page 213). Each of the sub-competencies, aside from grit,

as mentioned earlier (see page 216), were assessed in various ways across multiple cycles. The project-based activities in Cycles 2, 3, and 4 provided a level of freedom that made initiative, perseverance, productivity, responsivity, self-direction, and self-regulation essential, and provided ample opportunity for the students to practice these 21CC.

Despite (or perhaps because of) their struggle to develop these competencies, the students were quick to note their value and feel their affects:

> So what I've really learnt is discipline… 'cause you can't get anywhere in music without practicing… or anything that requires practicing… like the moment you learn something new... You have to go home and practice… redo it at least five times… like run over it like five times so you remember it… you can't be like… oh, I'll practice next week (Kate, Term 3 Focus Group 24 October).

> I think during the project I was a little bit like… I wasn't focusing at all, but now I think it really helped me… and now I think I am a little bit more focused. (Paul, Term 2 Focus Group, 1 August 2019)

Jack:	I think, like, I've learnt to focus a bit more, 'cause like I have ADD, which makes it hard to concentrate, but I think I'm like getting better at concentrating.
Teacher:	Great. And what is making you get better?
Jack:	I'd say… when there's like… a bit of… or like quite a lot of pressure… on me. It's weird 'cause it seems like… if I'm given a hard task… I'll like… complete it better than like an easier thing, 'cause… like with an easier thing… like you'll say I can do it later… and then later… I figure out… like I don't have time. But if it's something that's a lot harder… then I'll say… I absolutely, one hundred percent need to stay focused all the time and complete this as soon as possible.
Teacher:	Okay, so you're say that the pressure has been a good pressure?
Jack:	Yes, 'cause we learn to deal with problems better (Term 2 Focus Group, 1 August 2019).

In addition to the project-based activities, learning to pay an instrument made a significant contribution to the development of these 21CC, particularly perseverance. While I expect that learning to play an instrument in the traditional manner (face-to-face with an individual teacher) would also develop some 21CC, the flipped classroom delivery method provided the opportunity for additional competency development, by making students responsible for their own learning. Vuyo recalled her experience of learning to play the saxophone:

Vuyo:	In the beginning, when I got the saxophone, it looked really complicated. I didn't think I was going to be able to do it. And I think going throughout the year, it's actually quite easy, not easy, but simple.

Teacher: And how did you figure that out? How did it go from being really difficult to really easy?

Vuyo: I think I just kept pushing through even when it was hard (Term 3 Focus Group, 24 October 2019).

Nandi also explained how playing the clarinet had motivated her to keep persevering through a task she initially found difficult:

> For me, when I first got my clarinet, I had no idea what to do. But the little book that we got and the videos, it got easier to assemble your instrument every time you did it. And then when you started playing the instrument, the satisfaction of, oh, I played this note and it sounded nice, really helps you to keep going (Term 2 Focus Group, 1 August 2019).

Both Pelo and Sameer noted that the ability to execute competencies they had developed in the music class helped them to focus in other areas of their studies:

> I used to battle to concentrate before. It's helped me to concentrate a lot better. In English I struggled to concentrate and was struggling to understand things, but after you taught us, like self-regulation, I was like, I'm better now (Pelo, Term 2 Focus Group, 1 August 2019).

> I used to really hate studying, like I used to despise it, so anyway, music really helped me with focusing on studying. 'Cause when I usually study I would look at something else and be like, oh my gosh, this is so interesting. So this really helped me focus. And it gives like a reminder, like with music, I have to put my piece in to get what I need out. So that's also what I did with studying, and it really helped (Sameer, Term 3 Focus Group, 24 October 2019).

During this case study I came to see the ability to execute competencies as the most important set of 21CC. Abuhassan and Bates indicate that strong ability to execute competencies are a more accurate predicator of success and accomplishment than personality and IQ (2015, 205), but I had not anticipated that this competency area would have an impact on the observability of other competency areas. In many instances I noted that a lack of self-regulation made it challenging to observe students' other competencies, and that other competencies were only observable due to my teacherly insistence that the students persevere.

Information Processing Skills

Of the four 21CCs under the broad heading of information processing skills, I was only able to measure information literacy properly, and ICT operations and concepts to a lesser extent. The opportunity to explore and develop media literacy in any sort of meaningful

way did not present itself, while the exclusion of the website design project precluded digital citizenship all together. This competency area therefore showed the least growth during Cycles 1 to 4, but it did show substantial growth right at the end of the case study, in the Formal Assessments, perhaps because students approached them in a different manner.

I had purposefully included various technological activities, such as the online self-assessments, Aurasma-based treasure hunt, Google Docs-based worksheets, and Scratch-based coding, to develop and assess students' ICT operations and concepts, and had anticipated, given the students' preoccupation with digital media, that they would thrive at these activities. In fact, these competencies were slow to develop and they developed primarily through the instrument building project in Cycles 2 and 3, where students had to write computer code in order to trigger sounds on their instruments. Although technology had the potential to offer interesting and effective ways to explore content, at times it added a layer of complexity that hampered the development of other competencies.

Information literacy was assessed multiple times in each of the research cycles and, after a slight decline in Cycle 2, grew slowly but steadily. The 'elements of music' theme of this course meant that the students had to learn various new concepts and terminology. The students who were learning to play an instrument for the first time also had to learn how to read staff notation, which can be viewed as an entirely new system of information. Along with the concepts, terminology, signs, and symbols that students had to contend with, in each lesson they were provided with a self-assessment rubric that contained detailed descriptors of each of the 21CC that that particular lesson would challenge and develop. While this quantity of information overwhelmed the students at times, they grew through this challenge.

The self-assessment rubrics that contributed to the mass of information students acquired during the year became far more important to this study than I had anticipated at the outset of the research. As I explained above, they provided me with data to produce the competency profile maps seen in Figure 7.28 and 7.29, and provided insight into students' analytical skill development. In addition to this, they became important teaching and feedback tools. The rubrics provided information on each competency, and clearly described what the students needed to do in order to exhibit 'emerging', 'developing', 'proficient' or 'exemplary' levels of competency. This explicit focus on the 21CC aided

students in the acquisition of these competencies. Nthabi and Ben discussed this in our Term 2 Focus Group:

> Nthabi: If you say, do you concentrate in class and then there's an 'excellent', 'good', 'not quite there yet', and like, 'you need to work harder, it's kind of like – I can concentrate, excellent [making a tick sign in the air], but with you saying no, are you doing this, this and this, then it is making you think harder – am I really excellent at concentrating or am I just good at concentrating?
>
> Ben: And also, there are times when you aren't excellent, but you could be excellent, but you aren't putting forward enough effort.

Because students had explicit information on each of the 21CC, they could assess what they needed to do in order to improve and hone their information processing skills. This candid focus on my expectations, as well as the regular use of 21CC terminology in class, allowed the students and I to discuss their progress in relation to their self-assessment rubrics. This became a valuable, effective, clearly understood and transparent method of providing them with guidance and feedback in class.

Capacity for Change

The capacity for change competency area was the least developed during the baseline competency assessments during Cycle 1 – not surprisingly, since the students had hardly done anything yet, through which to show change – but, together with the interpersonal skills area, it underwent the most significant improvement during the case study. The project-based activities in Cycles 2 and 3, for example, provided ample opportunity for the students to become more creative and innovative, while flexibility and adaptability were needed to negotiate the unpredictable and unusual music course I had designed. Instrument building demanded that students generate an entirely unique and innovative design, and so they had to demonstrate this 21CC directly. At Redhill, it is not unusual for middle school students to take a Project-Based Learning class in which they work on interdisciplinary projects, but they had never experienced the pressure to create something entirely new, as they did in the music class:

> Diale: When we were making our instruments, we had to think of things ourselves. We couldn't make a different version or combine two versions together. We had to make it on our own.
>
> Ben: And there's no just like, make a recorder or make a… It's make something brand new and you'll be marked on its originality.

Kevin: Yes, and even in like PBL, where you're supposed to be making things, what we're doing now is making something that is *made*. Like, now we're making a hammock and like, that's already a thing. So, this is like a chance to make something new.

Ben: I think like in PBL you're not graded on your project's originality. Like if you make a… um… a bird that flies upside down… or something… you won't get marked on that originality. You just get marked on, does it function, does it work. Right? (Term 3 Focus Group, 24 October 2019).

This same group of students went on to further discuss the differences between the open-endedness of the music curriculum I devised, compared with their other school subjects:

Kevin: It's not like in maths, here's a sum, you get it correct you get a mark. It's like, build an instrument … the jury thing as well. So, it's different.

Diale: It's not like the other classes where they give you a specific task and if you get it even a little bit wrong, no mark, done. That kind of thing. It's much more relaxed in a way.

Kevin: It's like, if there is an answer and it could be correct, then like, you get a mark. Other subjects, it's wrong, it's wrong.

Ben: And it's just a lot more enjoyable in the concept of music rather than like maths or English (Term 3 Focus Group, 24 October 2019).

Kevin also noted that the freedom to be creative does put a greater demand on the student:

Kevin: Music's like your own thing, technically, so I don't do as well as if I'm like, told what to do. 'Cause if I'm told what to do, I can do it better than if I have to think of it myself and then try to execute it (Term 3 Focus Group, 24 October 2019).

These students raised several points that I found interesting, particularly the novelty of needing to think for themselves and the preoccupation with marks that pervaded this competency-based course. Despite the value that is ascribed to creativity and innovation in all subjects at Redhill, the students indicated that they felt that it was only in the music class that they were truly expected to "think of things [them]selves" (Diale). My conclusion is that taught in this way, music provides scope for unprecedented subjective interpretation and creative freedom.

All three of the students cited in the conversation above also referred to 'marks' in some way. Whether they were commenting on the fact that originality was not a criteria that was awarded marks in other subjects' assignments, comparing the way that music and maths are marked, or commenting on how much easier it is to get good marks when you are told

exactly what to do, these students highlighted the differences between what traditional school subjects and this music course valued. Music, whether in the class work activities of this course or – particularly – in the practical sphere, provides students with an opportunity to 'play', in the musical sense of performing on an instrument and in the recreational sense, in an arena governed by fewer boundaries than they are accustomed to. This freedom to play had a major positive impact on students' creative and innovative competencies.

Curiosity and metacognition, like ability to execute, positively influenced the acquisition and observability of other competencies. In some cases, I noted that a sense of curiosity generated an improvement in the ability to execute: the desire to explore and investigate an idea more deeply caused students to regulate their behaviour and work with greater initiative, productivity, and perseverance. Their metacognitive skills developed throughout this study and this was seen most clearly in the Instrument Karate belts they submitted. The act of learning to play an instrument through the flipped classroom demanded constant self-assessing and self-correcting, and students were able to recognise this growth within themselves. Sameer and Lesedi noted the following in our Term 2 Focus Group:

> Sameer: So I think it's helped me with communication. Communication towards, not specifically to my group or the group work, like that part of music, but with my instrument. 'Cause like you have to communicate, well not with the instrument, but like my hands. You have to communicate with yourself with what you're going to do with your hands and where you're going to put them and stuff, and it just like, you have to do that really quickly if you're playing a piece, so I think it's really helped me with communication.
>
> Teacher: Oh okay, so it's kind of like communication within yourself.
>
> Sameer: Yes!
>
> Lesedi: I feel like, with what Sameer said, communication within myself, 'cause in a brass instrument you kind of have to think about the note, think of its pitch, and then send the fingerings to your hands and your mouth (1 August 2019).

This internal communication and ability to talk themselves through the process of playing a piece was evident in some of the students, however, as the Instrument Karate repertoire became more challenging, some students did not exhibit this competency. Although, as I noted on page 160, I felt that this was a result of an 'ability to execute deficit', rather than an ability to think metacognitively. Vuyo acknowledged that learning to play an instrument had taught her about the process of learning, which is transferable to other tasks:

Vuyo: Well, with the instruments that we learnt at home, I thought it was cool that we kind of taught ourselves.

Teacher: Great, so do you feel that you learnt something through the process of learning to play an instrument?

Vuyo: Yes, like how to learn something new.

In summary, the 21CC that were most effectively developed through music were critical thinking, problem solving, communication, collaboration, initiative, self-direction, productivity, perseverance, responsibility, self-regulation, information literacy, creativity, innovation, flexibility and adaptability, metacognition, and curiosity. The musical activities that contributed to this development were learning to play an instrument in a solo capacity, playing an instrument in an ensemble setting, and learning and applying music elements terminology and notation information systems in various contexts.

The pedagogical methods of project-based learning, the flipped classroom, and gamification used to deliver and assess these musical activities were instrumental in the development of these 21CC. Overtly focussing on 21CC and providing students with explicit and detailed information on the course expectations, were other essential elements in the successful outcome of this case study. Using explicit rubric-based information to provide feedback and guidance in the classroom and allowing students to asses themselves and others, also undoubtedly aided in 21CC development.

Finally, the students themselves indicated that they felt that they could transfer the critical thinking, communication, self-regulation, and metacognitive competencies they had developed in the music class, into other areas of their lives.

Competency Development, Musical Development and Areas for Further Research

The aim of this study was to observe and analyse competency development through music. I was often aware that, to an extent, I was also investigating the reverse: how students' competency development aided their acquisition of musical skills. I thought it would be interesting to compare the students' musical ability with their competency profiles and in order to do so, I calculated the rank order of the class for each of these data sets, by combining the competency scores of each of the five broad competencies. The musical ability rank order was based on students' academic results (see page 180). This information can be viewed in full in Addendum 4.

My findings show that, for the most part, there is a strong correlation between musical ability and competency development, with students placing within five rank order positions of themselves on both lists 84% of the time. While this was not the focus of the study, the strong correlation between competency development and musical ability highlighted an area for further research.

The competency profile maps that I presented throughout this dissertation were derived and used for research purposes only. The students did not have access to these maps and had no indication, other than the feedback I provided on their self-assessment sheets, of how their competencies were developing. I found the competency maps incredibly useful in visualising competency development and wondered how students' access to this data would have impacted their competency acquisition. This is another potential area for further research: exploring the impact of explicit competency profile mapping in a classroom.

As I mentioned in Chapter 1, my goal in this study was to provide the music education community with practical examples from this research that they could adapt to their school or class, and to provide the broader educational community with another model for further development in research on 21CC. I think that any of my individual lessons, or even whole cycles, would provide such models, and I explore this issue in more detail now.

A Model for 21CC Competency Development

How can the model that I have developed in this research be further deveoped? First, I consider what it grew out of. Both Vasil et al. (2019) and Gilbert (2016) proposed models for developing 21CC through music using P21's Framework for 21st Century Learning (2009). Vasil et al. consider how popular music pedagogies can be used, and Gilbert explores the Common Core State Standards' impact on 21CC development. They were useful starting points for my research, but neither of the models they developed actually demonstrated 21CC development through empirical testing. Leonard Tan's (2017) study used the Singapore Ministry of Education's Framework for 21st-century Competencies and Student Outcomes (2014), assessing competency development in a music ensemble setting. It was conducted in a girls' school during one semester, with participants already having prior musical experience. My study was conducted in a co-ed school over two semesters (twice as long), and I had a class of mixed musical ability from the outset, which had both advantages and disadvantages. The activities through which my students'

competency development was observed were far more varied than Tan's: he looked at ensemble music performance only, whereas my study included solo performance, ensemble performance, instrument making, the learning of musical elements, and several other aspects of music, making it both a deeper and broader study than his, albeit still only a case study on one class of 23 students. Tan and I both conducted observations and focus groups, but Tan did not generate and report on quantitative data in his study. Along with my qualitative data, I provided competency profile maps that illustrated competency development over time and to this extent my study, although largely qualitative, has some quantitative aspects.

Competency profile mapping in a school setting has already been used, by Gusnardi et al. (2016), in their exploration of competency development in economics subjects in Pekanbaru, Indonesia. This study, however, considered only subject-specific competencies such as "posting to ledger" and "calculating foreign exchange rates" (2114) rather than 21st-century competencies in the broad sense, as I and others (see page 4) have defined them.

This dissertation is therefore, as far as I can tell, the first example of 21st-century competency development mapping in the subject area of music. It also appears to be the first such study conducted at middle school (young adolescent) level. How the methodology that I arrived at in order to generate the findings I have summarised in this chapter were developed, and what they consisted of (explicit 21CC focus and information, rubric-based assessments and self-assessments), is something that I now consider, in order to speculate on what can and cannot be transferred into other subject areas, and how my research might provide a model for other studies.

Adaptability and Transferability of the Case Study

As I mentioned in Chapter 2, this case study was conducted in an affluent and well-resourced school. Each student had access to their own iPad (or a similar device) and both the school and their homes had uncapped data services. The instruments rented to these students were worth between R3500.00 (US$212) and R9000.00 (US$548), and the music classroom was equipped with Apple MacBooks and various other technical apparatus (such as the Makey-Makey boards). While these resources were used throughout this study, however, I do not believe that they are essential to a course of this nature. Many schools worldwide use P-bone (plastic) equivalents to orchestral instruments

that are far cheaper and particularly useful at beginner level. South Africa has access to traditional instruments that cost far less than violins and percussion kits, through which the basic musical elements can be taught and Karate levels acquired.

Lessons – and not only music lessons – can be gamified in many ways, adding an element of fun and competition that not only motivates students to learn but also develops competencies. As Nthabi commented:

> I like, well I love how you take teaching and you make it a game. I think that's so cool and creative. You know, because, when you do, like as you said the lines, and the clapping game was actually a theory lesson, I didn't know that. I just thought it was a very cool, fun game (Term 1 Focus Group 28 March 2019).

She was perhaps referring to the clapping game I used to introduce rhythm, meter and tempo, or the game of 'pitch twister', a quick movement exercise or brain break (not reported on in the previous chapters). In the latter, I used masking tape to create the five lines of the stave on the floor and then instructed students to place various limbs on specific notes. Neither of these games required expensive resources, but provided students with a fun and memorable learning activity, as well as an opportunity to develop the competencies of perseverance, metacognition, collaboration, and self-regulation.

The game of Kahoot that students played in order to learn about pitch did require every student to have access to a device and Internet connection. The 21CC of problem solving, communication, collaboration, empathy, self-regulation, metacognition, and creativity, however, were not developed through the use of these technological elements alone but rather through class interaction following the game. A 'game show' activity can be achieved with students writing their answers to questions on white boards or pieces of paper, or points could be awarded to students who raise their hands and correctly answer a question in the shortest amount of time. In this type of lesson, technology can provide a platform to conduct a quiz, but is by no means essential.

The instrument design and copyright infringement court case projects made significant contributions to competency development in each of the five broad competency areas. These are both activities that can be duplicated or modified to suit different situations. My instrument building project did make use of hardware and software applications, true, but these were not entirely necessary to the development of 21CC *per se*. The project presented in this case study was to build an electrophone, because I wanted to stretch these quite privileged students, but any type of instrument can be designed and

constructed using recycled materials. Indeed, even the construction of an already known instrument out of (for example) found materials can develop the same competencies, even if it does not support the development of identical musical or technical skills.

Each of the other competencies can be honed through a project of this nature, with younger or older students, in different countries and situations. I anticipate that projects on any topic that include collaborative, self-directed elements, and demand critical and creative work, will develop the competencies of interpretation, communication, collaboration, initiative, self-direction, productivity, perseverance, responsibility, self-regulation, information literacy, creativity, innovation, flexibility, metacognition, and curiosity.

Learning to play an instrument in a solo and ensemble setting, and through the flipped classroom, were the learning activities that had the most significant impact on competency development in this study. This method presents many benefits and challenges, when considered in the context of a less well-resourced school. The challenges of implementing a flipped instrumental classroom are twofold. Musical instruments are pieces of technical equipment that are expensive to buy (as I mentioned above) and require regular servicing and maintenance. This could be overcome by running a recorder, vocal, or percussion programme (where students learn to play on drum pads rather than instruments, for instance).

Another challenge has to do with access to, and affordability of, online data, which is a serious problem in economically under-developed countries such as South Africa. Wenhong Chen and Barry Wellman note that "high costs… and the lack of technological support are barriers for disadvantaged communities using computers and the Internet" (2204, 25), while in an investigation conducted by the South African Competition Commission, Commissioner Tembinkosi Bonakele found that data prices in South Africa were "anti-poor" and "not sustainable" (cited in Dlulane 2019). Downloading and uploading video files requires a high bandwidth and data cap, and these services are not realistically affordable to students in low income homes. The online component of this aspect of the course did provide an added opportunity for competency development, but it would be feasible to provide instruction in class and then allow students time to practice and hone their skills at home. Recorder or percussion ensembles, even choirs, could be used to develop problem solving, self-presentation, perseverance, responsibility, self-regulation,

information literacy, and metacognition, provided that the lessons were conducted in a way that provided students with the opportunity to direct their own learning.

If the challenges of Internet access and data affordability can be overcome, and in a world of Covid-19 there is now a serious imperative to do so, then the flipped classroom method can provide students with high quality, specialised instrumental education, that could not be provided by a general class or arts and culture teacher. Many video resources, including my own[13], are readily available on streaming services such as YouTube and these do cover practical tuition on various instruments, as well as theoretical and historical musical information.

It may be possible to run a 21CC-focussed music course without the resources of an affluent private school, but it is not possible to teach it if music is not assigned a position within the curriculum. As I mentioned in Chapter 2 (see page 21), in many South African government schools, only basic music education is taught, often by teachers with little or no specialised training. During 2019, the Grade 7s at Redhill received an average of 80 minutes of music tuition per school week. The South African Department of Basic Education states that the Creative Arts should be allocated 2 hours of tuition each week, but this is divided between visual art, dance, drama and music, resulting in approximately 30 minutes of music tuition per week. In many situations music is not even offered because of a lack of resources and teachers (Jansen van Vuuren 2011, 9). Twenty-seven education goals for South Africa are set out in a document entitled "Action Plan to 2014: Towards the Realisation of Schooling 2025" (Department of Basic Education, 2012). This 210 page document does not make a single reference to music, or any of the arts and while these goals, which focus predominantly on access, resources, literacy and numeracy, are important, the positive role that music could play in building competency is not even acknowledged.

In Chapter 2, I identified a vicious circle that perpetuates inequality: students who do not have access to quality education are not able to develop the competencies they need in order to thrive in the workplace (Branso and Lam 2010, Salisbury 2016). The inability to thrive in the workplace means that these students will be unable to earn a comparable salary and, in turn, unable to provide their own children with a quality education. My hope is that, as more research on the importance of 21CC in education becomes available,

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[13] My YouTube channel can be viewed here.
(https://www.youtube.com/channel/UCFjFGeX9FnVahMMhwI4lcVg)

South Africa's education goals will be revised to include 21CC development, providing all South African students with the competencies they need in order to operate successfully in the workplace of the future, thus escaping the cycle of poverty and inequality.

This dissertation has shown that music can make a valuable contribution to the development of 21CC and should thus occupy a central role in school curricula, but it has also shown how necessary 21CC development – in any subject or context – is, to the development of people who will have to struggle with the workplace of the future and with challenges and environments that we can only begin to imagine.

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Addenda

Addendum 1: Ethics Approval Timeline

Date	Ethics Process
19 August 2018	Submitted documentation for ethics clearance
22 September 2018	Received institution permission to proceed with ethics clearance application
11 December 2018	Received notice that clarification regarding the filming of classes was required and that the REC office was now closed and would only be able to review revisions from the 10th of January 2019.
10 January 2019	REC Office opened for 2019. I contacted them to follow up clarifications I had submitted.
28 January 2019	Notice of ethics clearance approval received via email.
6 February 2019	Ethics Clearance Certificate received. Electronic copies of Informed Consent Forms distributed.
11 February 2019	Hard copies of Informed Consent Forms distributed.
27 February 2019	All Informed Consent Forms received

Addendum 2: Informed Consent Form

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STELLENBOSCH UNIVERSITY
PARENT/LEGAL GUARDIAN CONSENT FOR CHILD TO PARTICIPATE IN RESEARCH

I would like to invite your child to take part in a study conducted by myself, Angela Mullins, your child's music teacher and a PhD student at Africa Open Institute of Music Research and Innovation at Stellenbosch University.

1. PURPOSE OF THE STUDY

This study will form part of my PhD research. I am investigating the ways in which music can be used to enhance the development of 21st-century competencies (such as analytical skills, interpersonal skills, information processing skills, ability to execute and capacity for change) through the implementation of a future focused music curriculum.

2. WHAT WILL BE ASKED OF MY CHILD?

I have run earlier versions of this future focused music curriculum with my Grade 7 Redhill classes in 2016, 2017 and 2018. During 2019, I will continue to implement the same curriculum and approach to teaching, but now, I will also record the outcomes and results of this method with reference to 21st-century competency development.

If you consent to your child taking part in this study, I will then approach your child for their assent to take part in the study. If both you and your child agree to take part in the study I will do the following:
- Observe and record (through written notes and occasional video footage) your child's activity and interactions in my class.
- Use the self-assessments your child completes (as part of the learning process) as data for my study.
- Invite your child to participate in non-compulsory focus groups which will be audio recorded.

This study will take place throughout 2019.

3. POSSIBLE RISKS AND DISCOMFORTS

This study poses very little risk to your child as they will simply be participating in class activities as if no study were taking place. I will have a notebook to write things in and will occasionally bring a camera to record something for research only (not for publication). The only difference to any other school year will be that I will be collecting and analyzing the data generated by these classes.

One potential source of discomfort may be the focus groups, but these are optional. In these groups, students will be asked to comment on their experiences in the classroom and with me, their teacher. Students will be made acutely aware that they are under no obligation to participate in the focus groups or answer any questions that may cause discomfort. Students who do attend the focus groups and express their opinions will, in no way, be penalized for their contributions.

4. POSSIBLE BENEFITS TO THE CHILD OR TO THE SOCIETY

Twenty-first-century competency development is an incredibly important aspect of the general junior high curriculum, and a very important new area of educational research. This will be the first study of its kind in South Africa that explores how music can help develop these competencies and my findings could have considerable impact on future educational development in the country, for all children. In addition, a focus on these skills as well as a metacognitive understanding of how these skills are developed will be of great benefit to all student participants.

It is my hope that this study will showcase the strengths and limitations of a future focused music curriculum on the development of 21st-century competencies and will allow more students and teachers to benefit from this method.

5. PAYMENT FOR PARTICIPATION

No payment will be offered to students who participate in this study.

6. PROTECTION OF YOUR AND YOUR CHILD'S INFORMATION, CONFIDENTIALITY AND IDENTITY

Any information you or your child will share with me during this study and that could possibly identify you or your child will be protected. This will be done by assigning each student participant with a three-digit code. All data collected as well as any reference made to your child in the research report will be linked to this code, rather than your child's name.

Data will be collected through audio recording during the focus groups. These audio recordings will be used in place of note take so as to allow me to fully participate in the group discussions. After the focus groups, I will transcribe the audio recordings, replacing all names with the appropriate three-digit code, before destroying the audio recording. I will also occasionally video record some classes. Again, I will do this in order to free myself from note taking so that I can fully interact with the students. These recordings will also be destroyed once they have been analyzed and transcribed.

The data collected during this study will be published in my PhD Dissertation and possibly in related journal articles. In each case, your child's identity will be protected through the use of the three-digit code.

7. PARTICIPATION AND WITHDRAWAL

You and your child can choose whether to be part of this study or not. If you consent to your child taking part in the study, please note that your child may choose to withdraw or decline participation at any time without any consequence. Your child may also refuse to answer any questions they don't want to answer and still remain in the study.

8. RESEARCHERS' CONTACT INFORMATION

If you have any questions or concerns about this study, please feel free to contact the researcher Angela Mullins at amullins@redhill.co.za and/or the supervisor Prof. Christine Lucia at clucia@sun.ac.za.

9.   RIGHTS OF RESEARCH PARTICIPANTS

Your child may withdraw their consent at any time and discontinue participation without penalty. Neither you nor your child are waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your or your child's rights as a research participant, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the Division for Research Development.

DECLARATION OF CONSENT BY THE PARENT/ LEGAL GUARDIAN OF THE CHILD- PARTICIPANT

Please follow this LINK to complete the online consent form or complete and return this reply slip.

As the parent/legal guardian of the child I confirm that:

- I have read the above information and it is written in a language that I am comfortable with.

- I have had a chance to ask questions and all my questions have been answered.

- All issues related to privacy, and the confidentiality and use of the information have been explained.

By signing below, I _____ agree that the researcher, Angela Mullins, may approach my child to take part in this research study.

_____   _____

Signature of Parent/Legal Guardian   **Date**

DECLARATION BY THE PRINCIPAL INVESTIGATOR

As the **principal investigator,** I hereby declare that the information contained in this document has been thoroughly explained to the parent/legal guardian. I also declare that the parent/legal guardian was encouraged and given ample time to ask any questions.

_____   _____

Signature of Principal Investigator   **Date**

	STELLENBOSCH UNIVERSITY

ASSENT FORM FOR MINORS

TITLE OF THE RESEARCH PROJECT:
Future-Focussed Music Education: Developing 21st-century Competencies in a South African Middle School Music Classroom

RESEARCHERS' NAME:
Miss Mullins

RESEARCHER'S CONTACT DETAILS:
amullins@redhill.co.za

WHAT IS RESEARCH?
Research is something we do to find **new knowledge** about people or things. Research in schools help us find out more about children and teenagers and the things that affect their lives, their schools, their families and their health. We do this to try and make the world a better place!

WHAT IS THIS RESEARCH PROJECT ALL ABOUT?
Miss Mullins' research will look at how teaching and learning in our classroom helps you develop your 21st-century competencies (skills such as creativity, problem solving and teamwork) through studying music.

WHY HAVE I BEEN INVITED TO TAKE PART IN THIS RESEARCH PROJECT?
Over the past three years, Miss Mullins' Grade 7 classes have worked on developing their 21st-century competencies in their music class. In 2019, you will be in Miss Mullins' Grade 7 music class. She will continue teaching you, just as she has with all of her previous classes, but this time, she will record all of the lessons so that she can work out why and how this method works.

WHO IS DOING THE RESEARCH?
During 2019, Miss Mullins will be your teacher and a researcher.

WHAT WILL HAPPEN TO ME IN THIS STUDY?
Most of the time, you probably won't know that you are part of a study – you will just continue with your school work as normal. You may just see Miss Mullins taking notes while you work.

The one extra part of this research, that is not part of your school work, will be a focus group. This is a session that you can choose to be a part of, or not, where you can discuss what and how you have learnt in class.

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CAN ANYTHING BAD HAPPEN TO ME?

Nothing bad will happen to you in this study. You will simply continue with your school work as if no research were happening. Your name will not be used and video or audio recordings taken of you will only be used to record the results of the research, not as part of any publication. Once Miss Mullins has reviewed these recordings, they will be destroyed.

If you do not feel comfortable participating in the focus groups, you do not need to attend these. Miss Mullins will support you and not be angry or upset if you do not attend these sessions.

CAN ANYTHING GOOD HAPPEN TO ME?

Developing your 21st-century competencies is a very important part of your education. Focussing on these skills and learning how to develop them will be very good for you. If any part of my research that involved your class is published, I will let you know, and you can feel proud of having been part of it.

WILL ANYONE KNOW I AM IN THE STUDY?

When Miss Mullins collects information about you or writes about the work you are doing, she will refer to you as a code and not your name. This will make sure that you are protected, and no one will know who she is talking about in her research.

WHO CAN I TALK TO ABOUT THE STUDY?

If you have any questions about this study, you should talk to Miss Mullins who will help you to understand anything you are unsure about.

Your parents have also received information about this study and will be able to talk to you about it.

WHAT IF I DO NOT WANT TO DO THIS?

If, at any time, you decide that you do not want to be involved in this research you should let Miss Mullins know. Miss Mullins will keep being your music teacher, but she will no longer record your information for her research. Miss Mullins will support you and not be angry or upset if you decide that you do not want to be involved in this research.

Do you understand this research study and are you willing to take part in it?

YES	NO

Has the researcher answered all your questions?

YES	NO

Do you understand that you can STOP being in the study at any time?

YES	NO

_____   _____
Signature of Child   Date

Addendum 3: Instrument Rental Letter and Pledge

Dear Parents,

This year, we will be placing a greater emphasis on the practical component of Junior High Music. Current neurological research has found that playing a musical instrument is one of the best things you can do for the brain. Playing music is the brain's equivalent of a full body workout! The benefits of playing a musical instrument are highly transferable and will impact your child in every aspect of their lives.

Each child who has selected music as a subject will be expected to learn to play an instrument. Buying a musical instrument can be a huge outlay, particularly for students who may not choose to continue with music in Grade 10. As such, Redhill has a large number of instruments which will be available for rental to the students.

The practical component of music will be taught through a flipped classroom. I have produced a series of videos which will take students through the basics of their new instrument. We will also have ensemble classes in which the students will have the opportunity to perform together.

Students who already play an orchestral instrument and attend individual lessons with a practical teacher will not need to play an additional instrument and may participate in the ensemble classes on their own instrument. In place of the marks generated through the practical flipped classroom tasks, students who take individual lessons may submit a termly report from their individual practical teacher in addition to occasional video assignments.

Students who make use of the school's instruments will be charged a termly music levy of R250.00. This levy will go towards the costs of servicing the instruments at the end of each year.

The costs involved in repairing or replacing an instrument that is damaged or lost while in the students' care will be for the parents' account. As such, we recommend that you place the instrument on your insurance policy. The replacement values for each instrument are as follows:

Flute	R4 500.00		Trombone	R5 000.00
Oboe	R27 000.00		Euphonium	R9 000.00
Clarinet	R4 800.00		Violin	R4 800.00
Saxophone	R7 900.00		Viola	R9 000.00
Trumpet	R3 500.00		Cello	R12 000.00

Students who are not in a position to take on the financial burden of an instrument may opt to do the practical component of their studies on a recorder, which may be purchased for R90.00.

Please see the attached Musical Instrument Pledge which both students are parents will be required to sign before an instrument will be released.

Please feel free to contact me should you require any additional information.

Kind Regards
Angie Mullins

Instrument Pledge

- I acknowledge that it is a tremendous privilege to have the opportunity to learn to play an instrument. Not only will I develop my musical talent, but I will also develop a host of other critical skills that I can transfer into other areas of my life.

- I acknowledge that I will not make any progress if I do not practice. Short, regular practice sessions are best. I will aim to play my instrument for at least 5 minutes a day, at least 5 days a week.

- I acknowledge that musical instruments are highly technical and expensive pieces of equipment. They are easily damaged if not treated and maintained in the appropriate way. I will familiarise myself with the correct way to care for my instrument and always treat it with the utmost respect.

- I acknowledge that I am responsible for my instrument and will be liable for the costs involved in replacing or repairing if it is lost or damaged while in my care.

Instrument   _____

Barcode   _____

Replacement Value   _____

Student's Name   _____

Student's Class   _____

Student's Signature   _____

Parent's Name   _____

Parent's Signature   _____

Date   _____
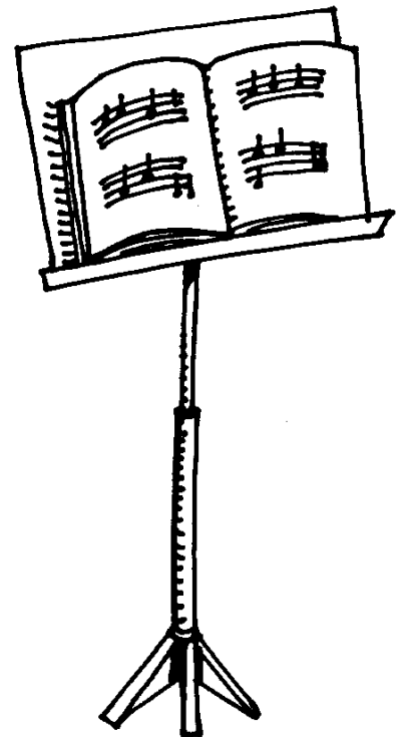
Addendum 4: Competency Profile and Music Mark Rank Order Comparison

Cycle 1			
Competency Profile Rank Order		Music Mark Rank Order	
1	Lesedi*	1	Kate*
2	Nthabi*	2	Lesedi*
3	Priya*	3	Priya*
4	Mia*	4	Mia*
5	Kate*	5	Nthabi*
6	Diale	6	Ben*
7	Vuyo	7	Sameer
8	Ben*	8	Trinesh*
9	Kevin	9	Kevin
10	Sameer	10	Vuyo
11	Tim	11	Nandi
12	Trinesh*	12	Jack*[+] (+8)
13	Nandi	13	Mike
14	Dinka*	14	Tim
15	Mike	15	Diale[+] (-9)
16	Pelo	16	Kylesh*
17	Kylesh*	17	Dinka*
18	Ethan	18	Travis
19	Travis	19	Paul
20	Jack*	20	Josh
21	Paul	21	Pelo
22	Emma	22	Ethan
23	Josh	23	Emma

Cycles 2 and 3			
Competency Profile Rank Order		Music Mark Rank Order	
1	Ben*	1	Mia*
2	Sameer	2	Lesedi*
3	Mia*	3	Priya*
4	Lesedi*	4	Ben*
5	Travis	5	Kevin
6	Priya*	6	Sameer
7	Nthabi*	7	Kate*[+] (+7)
8	Tim	8	Vuyo
9	Kevin	9	Nthabi*
10	Vuyo	10	Emma[+] (+9)
11	Jack*	11	Tim
12	Nandi	12	Paul[+] (+8)
13	Trinesh*	13	Nandi
14	Kate*	14	Trinesh*
15	Diale	15	Kylesh*[+] (+8)
16	Dinka*	16	Dinka*
17	Ethan	17	Travis[+] (-12)
18	Mike	18	Ethan
19	Emma	19	Josh
20	Paul	20	Jack*[+] (-9)
21	Josh	21	Pelo
22	Pelo	22	Mike
23	Kylesh*	23	Diale[+] (-8)

Cycle 4			
Competency Profile Rank Order		Music Mark Rank Order	
1	Priya*	1	Kate*
2	Ben*	2	Lesedi*
3	Kate*	3	Priya*
4	Lesedi*	4	Ben*
5	Mia*	5	Mia*
6	Trinesh*	6	Nthabi*
7	Travis	7	Sameer
8	Dinka*	8	Trinesh*
9	Sameer	9	Dinka*
10	Vuyo	10	Vuyo
11	Nthabi*	11	Tim
12	Tim	12	Nandi[+] (+6)
13	Kevin	13	Paul[+] (+8)
14	Mike	14	Jack*
15	Diale	15	Kevin
16	Jack*	16	Mike
17	Kylesh*	17	Pelo
18	Nandi	18	Travis[+] (-11)
19	Pelo	19	Kylesh*
20	Ethan	20	Diale
21	Paul	21	Ethan
22	Emma	22	Josh
23	Josh	23	Emma

Formal Assessment			
Competency Profile Rank Order		Music Mark Rank Order	
1	Mia*	1	Kate*
2	Priya*	2	Mia*
3	Ben*	3	Priya*
4	Kate*	4	Lesedi*
5	Nthabi*	5	Trinesh*
6	Trinesh*	6	Ben*
7	Sameer*	7	Nthabi*
8	Lesedi	8	Sameer
9	Diale	9	Jack*
10	Nandi	10	Pelo[+] (+6)
11	Vuyo	11	Mike
12	Dinka*	12	Nandi
13	Tim	13	Tim
14	Jack*	14	Travis
15	Mike	15	Dinka*
16	Pelo	16	Kevin
17	Travis	17	Vuyo[+] (-6)
18	Ethan	18	Ethan
19	Kevin	19	Paul
20	Kylesh*	20	Emma
21	Paul	21	Kylesh*
22	Josh	22	Diale[+·] (-13)
23	Emma	23	Josh

*Students who had completed graded music examinations before starting this course.

[+]Students with a difference of more than 5 rank order positions within one cycle. Difference indicated in brackets.