Teachers' "transformational learning"? A case study of teachers' views of knowledge as they participate in a collaborative think tank

Dawn Ann Sullivan

A thesis submitted to

Auckland University of Technology

in fulfilment of the requirements of the degree of

Master of Education (MEd)

2018

School of Education

Faculty of Culture and Society

Abstract

In recent years, future focused thinkers have described an unprecedented rate of change in the Western World. At the end of the 20th century and into the 21st century, there have been documented revolutionary shifts in the way people work and live. Subsequently, a new age was defined and we are now thought to live in the "knowledge age". It has been suggested that the wide differences in the way people live their lives has, for some people, been destabilising and also that the accelerated rate of change has been too fast, thus creating a feeling of shock, unrest and resistance to change.

Future-focused educationalists have argued that changes in education have not kept pace with the changes happening in society. This is thought, by some people, to relate to the way teachers think about their roles and to the expectations communities have of schools. That is, since teachers and parents have usually experienced schooling themselves and often hold deeply ingrained beliefs about what schools should look and feel like as well as what teachers should spend their days doing, teachers have held on to methods which relate more to the industrial age than to the knowledge age. In recent years, there has been a call from future-focused educationalists for schools to provide future-focused professional learning opportunities for their teachers which could enable them to shift their thinking and to rethink their roles for the knowledge age. Here I present an investigation of one intervention which could enable such a shift.

This project is a narrow case study viewed through the lens of complexity thinking. The study considers the impact of interactions for a group of teachers as they participate in a collaborative think tank. The think tank group was set up before the research project was proposed, and it took place independently of the research. The think tank was developed by members of the study school to enable a group of teachers to work collaboratively over time. The study school worked closely with an external educational professional to ensure think tank topics were future focused, in accordance with the school's motto: "Future Ready". Part of the work of the external educational professional involved ensuring that think tank topics were based on current research. Participants of the think tank were interviewed by the researcher to ascertain the nature and extent of interactions they had as a result of the think tank topics and how far these interactions impacted on their views of knowledge and education. The major findings of the study are:

- Many conversations and interactions occurred as a direct result of the think tank
- The interactions resulting from think tank topics differed from interactions which participants usually had
- For at least the duration of the project, participants of the think tank shifted their views of knowledge
- The shift in the participants' views were often a direct result of their interactions emerging from the think tank topics

The project concludes with a series of recommendations regarding new forms of teacher professional learning and development (PLD) for the knowledge age.

Table of Contents

List of Figures

Appendices

Attestation of authorship

"I hearby declare that this submission is my own work and that, to the best of my own knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institute of higher learning"

Signed _____

D A Sullivan

Acknowledgements

Primarily, I would like to extend my sincere thanks to Dr Jane Gilbert of the Faculty of Culture and Society at Auckland University of Technology. It has been an honour and a privilege to work alongside Dr Gilbert who has continually extended and challenged my thinking.

Furthermore, I would like to thank Timothy Oughton, Adam Heath and Brendan Kelly, three of the senior leaders at the study school who were involved in the creation of the think tank structure. These leaders graciously allowed me to base my research project on this concept. Additionally, thanks must go to Anne Sturgess who was a founding member of the think tank and who inspired me and shared her own ideas and thoughts throughout this project.

Lastly, my thanks must go to my two children, George and Eve, who have supported and encouraged me to persevere.

Chapter One: Introduction

> "Better is possible. It does not take genius. It takes diligence. It takes moral clarity. It takes ingenuity. And above all, it takes a willingness to try."
>
> Atul Gawande (2007)

1.1   Introduction

When Alvin Toffler (Toffler, 1970) coined the phrase "future shock", he was referring to the belief that people tend to feel disoriented by sudden change. Toffler was comparing the impact of the rapid changes happening in society at the time to the feelings experienced during sudden changes in culture as a result of easier access to travel: the well-known phenomenon of 'culture shock'. The changes occurring in society, economics and politics at this time did not slow. In fact, during the late 20th century the pace of change accelerated to such an extent that a new age was identified which became known as the 'knowledge age'. It has been suggested (e.g. Castells, 2000) that the world is now immersed in change at such a rate that there has been, and continues to be, a "tidal shift" in the way people work and live (K. Robinson, 2011, p. 81). Academics (e.g. Facer, 2011; Gilbert, 2005; Hargreaves, 2003; Leadbeater, 2011) argue that in these times, knowledge and learning are not the exclusive focus of schools and educational establishments, but have become the domain of many other aspects of society to the extent that we are now deemed to live in a "knowledge society".

The rapid movements experienced in our global society are highly likely to impact on the education system in New Zealand. Over recent years, it has been suggested that education has not kept pace with the changes happening in society (e.g. Zimmerman, 2006). The "quest for stability" (Fink & Stoll, 2005, p. 18) from teachers and the wider community is perceived to be a consequence of deep-seated beliefs about what the education system should look like and what it is for. It is argued that transformations in the *way* teachers think will be necessary if we are to move the education system in the direction needed for the current age (Berger, 2007; Gilbert & Bull, 2015). It has been suggested that true transformations in the way teachers think are unlikely to result from giving teachers new ideas and telling them to think in new ways (Gilbert & Bull, 2015). Additionally, uncovering a person's true belief and deep-seated assumptions regarding complex issues is unlikely to be possible by obtaining answers to direct questions. Consequently, there is difficulty in how we even approach thinking about the type of paradigm shift within teachers which would see them rethinking their whole role and actually believing in and accepting a different way of working. An investigation into such transformations is likely to be tricky and require an alternative to an empirical study of "best practice" approaches to the teaching role. This project considers the complexity involved in the transformational learning of teachers as they work together. It involves two research questions which are not directly related to each other but are designed to merge in such a way that the effect of collaboration on the teachers' thinking can start to be uncovered. The project is an investigation into one intervention

which is designed to provide a group of teachers with the opportunities to question their established thinking about New Zealand education, and specifically their views on knowledge, as they collaborate in an organised think tank. The focus on teachers' changing views of one aspect of education, knowledge, is an attempt to reduce the complexity of the study.

1.2   Background to this Study

Some educationalists (e.g. Beare, 2001) argue that the current schooling system was set up for a different age, one in which the future was thought to be predictable and knowable, where a production line model created what was needed for the early 20th century workforce. There are some obvious observable differences between the needs of education in the mid to early 20th century and education today. For example, during the mid 20th century, only a very small proportion of the population attended tertiary education and a university degree provided a near guarantee of employment. Tertiary education was not an option for many students and, in New Zealand, less than half of school aged learners gained a high school qualification. This qualification mainly assessed students' knowledge of factual information and employers used the results of these qualifications as a means to sort prospective employees. The learners who could recall factual information and repeat that information in an examination were more employable than those who could not. Additionally, teachers who could impart the knowledge in a way which enabled learners to remember and repeat that knowledge were successful teachers. High school teachers aimed to be experts in their curriculum field, to hold as much knowledge about a particular subject as they could and to pass this on to their students. During this time, in many countries of the Western World, the workforce was around 80% manual labour and the education system was set up to provide for that need (Claxton, 2008). "Academic inflation" towards the late 20th century has resulted in a number of observable changes (K. Robinson, 2011, p. 49). A university degree, still often heavily based on factual recall of specific pieces of information, had a far lower market value at this time. With a higher proportion of the population gaining university qualifications, the level of qualification required for most jobs had risen and a university degree was no longer a ticket to employment. Additionally, as we moved into the 21st century, knowledge held within a person as specific pieces of information became far less important than it once was. This was mainly due to the rise of the internet which allowed people to access information quickly and easily so that in the knowledge society there is no real need for most people to retain lots of knowledge within themselves. Furthermore, with the advancements in technological devices, access to the internet has become very easy and it has become possible to access factual knowledge in almost any situation. Some educationalists argue that our school education system has not taken all of this into account and that teachers are still working with a model in which they feed knowledge to their students with the aim of enabling the students to repeat this knowledge in an examination. It is suggested that education is one of the very few aspects of Western life which has been largely unchanged over the last twenty years (Beare, 2001). The deeply ingrained beliefs that individuals, specifically teachers, hold regarding what a school education should look like arguably hold our education system

back, and it is suggested that students continue to be prepared for a society which no longer exists (e.g. Zimmerman, 2006). This has created concern and unrest which has been voiced by educators and many future-focused educational researchers (e.g. Facer, 2011; Gilbert, 2005; Hargreaves, 2003). There are numerous calls for a transformation of the schooling system with sweeping radical change being advocated for over the tweaking of the current system (Gilbert, 2005; K.Robinson, 2011). It is suggested that far-reaching changes are needed if schools are to be part of a system which will enable success in our 21st century learners, and improve the chances that they become valued members of the knowledge society in which they live (Claxton, 2008).

Much has been written about future-focused teaching and the implications that this will have for today's learners. It is strongly argued (Beare, 2001; Bull & Gilbert, 2012) that traditional methods of schooling are not going to work in what Sardar (2010) terms these "postnormal times". Different pedagogies incorporating modern technologies and more collaborative practices in the classroom have emerged in recent years which have given the classroom environment a different look and feel. Nevertheless, it has been argued that the end result, the actual practice of what is happening in schools, is still firmly entrenched in delivering factual knowledge (Claxton, 2008). Many of the arguments for a paradigm shift in the structure of schooling are strong and compelling but the main changes which have taken place in in recent times in schools have involved doing the same things, including high stakes assessments involving high levels of factual recall, differently (e.g. K. Robinson, 2011).

Professional Learning and Development (PLD) for teachers in recent years has centred on how to teach the same things in different, more modern ways (Timperley, Wilson, Barrar & Fung, 2007). There appears to be a gap in terms of transformational learning of teachers which must be bridged if we are to be successful in reaching the goals which have been advocated. More specifically, the creation of a revolutionised education system and a transformation of teaching will likely initially involve a transformation in the way teachers actually think and what they believe their job to involve (Gilbert & Bull, 2015). Without significant cognitive shifts for teachers we will, at best, achieve superficial, short lived changes in the way the current system is delivered (Berger, 2007). In order to accommodate this, there will likely be a need to afford teachers the opportunity to expand their thinking, to undergo "transformational learning" which involves changing the structure of how teachers make sense of the world around them and how this fits with the work they do (Gilbert & Bull, 2015, p. 5). In their consideration of "shifting teachers' paradigms for the future", Gilbert and Bull (2015) argue that it will not be sufficient to continue to add to what teachers know, they must question *how* they know this information if they are to undergo true transformational learning. They claim that ingrained beliefs, which encourage teachers to work in a disciplinary structure based on a transfer of factual knowledge from teacher to learner in a system which gives disciplines a hierarchy, are no longer useful.

Many academics claim that new ways of working *with* teachers must be sought if we are to enable the substantial changes in thinking required to align education with the outside world of the knowledge age (e.g. Gilbert & Bull, 2015). In the project described here, I consider an

intervention, a think tank, which aimed to afford teachers the opportunity to expand their thinking without overloading them with specific pieces of information. The intervention was not intended to provide new ways of doing things which teachers could then go away and practise; it was not based on 'best practice' ideas which can be trialled and tested to discover whether better results are obtained. Rather, the intervention was designed to ascertain whether providing teachers with the time and space to collaborate with their colleagues and to consider and question their beliefs about the education system could enable a shift in their thinking about one aspect of their work; knowledge. The research project described here studied this think tank, its aim was to consider 1) the number of interactions and 2) the impact of those interactions. The project required two rather different research questions, the findings of which were merged to complete the study.

1.3   Personal Assumptions Leading to this Study

My whole career so far has been in education. I have worked as a Chemistry and Mathematics teacher in a number of different types of school in both the UK and in New Zealand. During my thirty year career, there have been changes for which my colleagues and I have needed to 'upskill'. These changes have included the move away from chalkboards to whiteboards and then smartboards, differentiated learning and the introduction of 'internal' assessments. More recently, 'bring your own device' and integrated teaching approaches have been on the list of new experiences for teachers. In that substantial period of time when the world outside of the schooling system was changing at an ever accelerating rate, it struck me that, whilst how I teach does look more modern than when I was a new teacher; what I teach in the classroom has changed very little. I am very aware that my students can now find knowledge about the periodic table and atomic structure by a range of methods which are possibly far more engaging than my telling them would be. I am also aware that many of my students have the capacity, ability and desire to use what they know in order to consider some of the problems the world is facing. Brief conversations with my colleagues in the staffrooms have suggested that teachers feel ready to take on the challenges that we might face in making our schools more relevant for the 21st century. Recurring themes from these conversations suggest that the barriers to change, according to teachers, are that teachers are not given the time and structures to enable stronger lines of communication and collaboration.

Having read literature from future-focused educationalists, (e.g. Bull & Gilbert, 2012; Bolstad & Gilbert, 2012) I have considered their calls for teachers to be given opportunities to communicate and collaborate both within and across schools. In my view, collaboration is essential if teachers are to be able to be comfortable with their own uncertainties and see different perspectives. Additionally, I believe that a collaborative culture is more likely to provide a platform for teachers to question their deeply held beliefs, compare those beliefs with those of other teachers and develop a collective responsibility to move forward. I feel that these aspects are essential components of this project since I believe that the best way for a person to

question their own thinking is to discuss it with other people who have a shared interest. I also hold the belief that a person is unlikely to change their views until they have been given time and space to question their current beliefs and view them in a new light. My own experience and anecdotal evidence which I have collected when talking to teachers has led me to surmise that collaboration will be an essential aspect of transforming the education system. I have worked with a number of teachers who have taken their own PLD very seriously. These teachers have deliberately formed collaborative groups, intentionally inviting members who they know will ask the hard questions and challenge all participants. Observations of these teachers have led to a further personal assumption that the deliberate act of supporting the cognitive growth and the expectation of continuous growth for teachers is key to fostering the changes required to the system as a whole. Moreover, it is my belief that the traditional one and two day PLD programmes, which are intensive and informative, will not produce the shifts we currently require. Observations have led me to believe that, whilst this 'one-off' model of professional development may enable people to share good ideas, it rarely creates shifts in habits of experienced teachers.

Additionally, I have considered the literature which suggests that, in this knowledge age, there is far greater volatility, uncertainty, complexity and ambiguity (VUCA) than experienced in any other period (Berger & Johnston, 2015). The level of 'VUCA' we are currently experiencing has resulted in change being very difficult to predict and embed. Best practice, which works well in a complicated system, cannot be relied on in a complex system. Snowden & Boone (2007) discuss the difference between complicated and complex spaces and their work has led me to the conviction that, if we continue to treat schools and the education system as merely complicated systems, we will not produce the shifts which some educationalists are arguing for. In a complicated space, best practice works. That is, if a method is found to be successful on trial, it will continue to be successful. Schools are often viewed as 'complicated' since they have many components, and so they are not simple, but they are highly organised. I believe that this is an oversimplified way of considering the school system. There are many aspects and forces which influence the happenings within a school and even more so within the education system as a whole. In a complex space, which I believe includes schools, best practice methods do not always produce the same outcomes. There are too many factors to consider if we are to ensure any given practice will produce the desired results. Therefore, it makes sense to me that the consideration of the complexity of the school system is an essential component of this project, since without it, it is unlikely that reform will be long lasting. There is complexity in this project partly due to the focus on interactions between people. Similar conversations and interactions between two sets of people can easily bring about different outcomes since unique past experiences and beliefs will influence the thinking of each person. Consequently, I use complexity theory, discussed in more detail later in this thesis, as a lens through which to view this project.

1.4   The Intervention

The purpose of this project is to investigate one type of structure which may facilitate and enable transformational learning and thinking in teachers. Its aim is to consider an intervention to facilitate teacher PLD which may enable cognitive growth and transformational learning in teachers. The investigation was planned as a complexity informed case study of the views and thinking of a group of teachers as they participate in a collaborative think tank. It considers the impact of enabling collaboration and facilitated research on the shift in views on knowledge of a group of teachers from different areas of a school. The project explores the nature and extent of interactions together with the teachers' views on knowledge and education before and after the think tank sessions with the aim of considering whether this form of intervention could facilitate a shift in the views of a group of teachers.

The scheduled meetings for the think tank group were facilitated by an external educational professional, but members were encouraged to organise their own discussions and gatherings between meetings. The group was set up prior to the proposal of the research project, and it took place independently of the project. The think tank provided seminars which enabled time and space for members to consider, digest and debate thought-provoking ideas in relation to teaching and learning for the school's community. Members were encouraged to question their own beliefs and to use recent research to identify areas where shifts in thinking may lead to improvements.

The group of teachers chosen for the think tank were eight volunteers from different faculties in a year 0-13 independent day school in Auckland, New Zealand. The eight teachers were approached by the researcher and asked whether they would like to be members of the think tank group. The group met six times between May and December 2016.

1.5   The Focus on Knowledge and Education through a Complexity Lens

One person's individual learning and cognitive growth will be dependent on a large number of factors. It is unlikely that one set of practices or methods would bring about exactly the same outcomes for different individuals. For example, past experiences, beliefs and involvement in different projects will all influence a person's new learning. The extent to which these factors influence an individual's learning are difficult to predict with accuracy. For these reasons 'best practice' methods are unlikely to be successful in bringing about predictable outcomes in the learning or shift in thinking of individuals (Snyder, 2013).

As with any type of learning, the effect that interactions have on a person are influenced by a large number of factors including previous experiences (Claxton, 2016). Consequently, it is improbable that interactions between people, even identical interactions, would have the same impact on each of those individuals or bring about the same outcomes. Furthermore, within even a small group of individuals there are a number of ways in which connections can take

place. If, for example, we consider a group of seven people as dots on a page and look at the number of ways those dots can be joined to form clusters of two, three, four etc., there are a very large number of permutations. In consideration of these issues, for this project, groups of interacting individuals are seen as complex systems and complexity thinking is the lens through which the research is viewed. The project considers a group of seven individuals but even within this small number there are a large number of possible types of interaction and each interaction could involve a number of topics that the group were encouraged to discuss. In an effort to reduce the complexity of the case, this research project considers one aspect of the teachers' thinking: their views on knowledge.

Whilst it is suggested by some that knowledge within educational establishments continues to focus on facts and data, the definition of knowledge is changing in the world outside of education. During the 20th century the definition of knowledge was straightforward, it came to mean a collection of facts accumulated over time. In schools, these facts were divided up into discipline areas in order to enable specialist teachers to transfer those facts to the student. In this way, students who could recall the facts in order to answer questions in tests were deemed more academically able (K. Robinson, 2011). More recently, there has been a shift in thinking. Today, knowledge is more usefully viewed by some as a form of energy (Castells, 2000) with knowledge being needed to facilitate action. It has been argued that the ability to learn and know how to learn is becoming far more important than the propensity to know facts. Whilst disciplinary factual knowledge is still of importance and should not be totally ignored by educators (Bereiter, 2002), the ability to problem solve by considering a wide range of possible solutions is becoming more important than finding the 'right answer'. Therefore, educationalists (e.g. Gilbert, 2005) argue that there is a need to adopt a different view of knowledge, one which considers knowledge as something with which we can do things rather than knowledge as a collection of facts and data which can be transferred from one person to another.

The question about what we now mean by knowledge and how knowledge has changed over the last two decades has not only been debated by future-focused educationalists. The OECD were at the forefront of interest in what knowledge now means in the knowledge age and this led to interest from businesses, politicians and the European Commission. The knowledge triangle ("Knowledge Triangle and Innovation", 2017) which refers to the boundary between research, education and innovation, seen as key drivers of a knowledge-based society, has recently been used to create debate within such groups about what knowledge means in these times. According to research, the key to a strong knowledge society will not be how quickly people can access information and knowledge but how well they can process the information they are given (Castells, 2011). There are implications here for this project as the research suggests that teachers will not only need to consider their role and how they deliver a school curriculum, but also they will need to reconsider their own views on knowledge.

Teachers in the knowledge age are likely to need to reconsider their role. They will possibly need to reconsider methods by which they can provide students with the tools to use their existing knowledge and to create new knowledge. This will require a substantial mind shift for

those teachers who have themselves been successful in an education system designed for an industrial age society. Teachers will need to view themselves not as the holder and giver of knowledge, but as the facilitator in enabling learners to utilise the knowledge they have. This shift will likely be difficult to achieve, will require thought and scaffolding and will involve significant cognitive development. The think tank was set up as an intervention to investigate how these changes might take place and this project looks at whether interactions resulting from the think tank were useful in aiding the shifts in thinking about knowledge.

1.6   Research Questions

In an effort to think about whether interactions between teachers could be useful in aiding shifts in thinking, I considered four main bodies of literature: future-focused education, complexity thinking, adult cognitive development and teacher professional learning and development. The literature on future-focused education calls for transformational changes in schools which would require modifications in the way teachers perceive their role and the way they actually think. The future-focused education literature was the starting point in developing the research questions for this study; specifically, if a transformation in the way teachers think is needed, my initial thoughts were 'how can schools even start to facilitate that type of change?' As the focus is on a shift for teachers, rather than students, and the ways teachers actually think, the literature on PLD for teachers was also thought to be relevant, as was the literature on adult cognitive development. I agree with the argument in much of the current literature regarding teacher PLD which suggests that giving teachers good ideas will be unlikely to create shifts in their thinking (e.g. Gilbert & Bull, 2015).

I became interested in the suggestion from some educationalists (e.g. Gilbert & Bull, 2015) that providing opportunities for interactions may help teachers to develop new ways of thinking. When I started to plan this project, the think tank had already been proposed by the study school and this gave me the perfect opportunity to consider an investigation of interactions between this group of teachers. Initially, it was decided to look at the nature and extent of interactions between the participants of the think tank. These teachers would not normally meet each other much during the course of a usual school week. The think tank provided the chance for them to meet and gave the opportunity within this project to investigate a group of individuals. These individuals were given a platform to interact regarding education. The nature and extent of interactions was seen as the first important focus for the study. That is, of significance was the question of whether the think tank did actually provoke interactions between the participants and what these interactions were like. This would not be the only important consideration, however, since the interactions would need to have an impact on the participants in order to create any shifts in thinking. A topic of conversation within the think tank meetings was knowledge; specifically, what we mean by knowledge in the knowledge age. Consequently, it was decided to uncover the impacts of the participants' interactions on their views of knowledge.

It also became apparent that it would be important to consider the complexity of the case. That is, since an interaction between two people may have very different outcomes in their thinking than the same interaction between two different people, the case is not a study of best practice bringing about repeatable results. Therefore, it was important to consider the literature on complexity thinking when undertaking this study.

The research questions under investigation were:

- What is the nature and extent of a group of teachers' interactions as they participate in a think tank set up to foster collegial professional debate?
- To what extent do these interactions impact on the teachers' views of knowledge and education?

The first question relates to the intervention, the think tank, and considers how far the group of teachers involved with the think tank engaged in interactions as a result of the think tank topics. The second question looks at the shift in thinking of the members of the think tank as a result of those interactions. The scope and timeframe of the project necessitated a focus on one narrow aspect of teachers' thinking and, since the think tank had been considering changing views on knowledge, I decided to make this the major focus.

1.7   Research Design

Participants of the project were interviewed face-to-face on two separate occasions. The interviews were designed to uncover whether they had been involved in interactions as a result of the think tank and also whether these interactions had impacted on their views of knowledge and education. The first interview took place when the think tank had recently been formed and the second interview took place eight months later, towards the end of the school year.

Once the interview phases had taken place, there were two distinct parts to the analysis of the data. The first part involved taking a count of the number of interactions which had taken place before and after the think tank sessions. This part of the analysis was purely quantitative but did not require statistical rigour. Following on from this, the second part of the analysis was qualitative and involved a consideration of the participant's views on knowledge and education before and after the think tank sessions. The overall design was a qualitative case study (Creswell, 2014), the purpose of which was to use qualitative results to support an explanation and to assist in interpreting the findings of a narrow quantitative study. The initial quantitative data, which was a simple count of the number of interactions which had taken place between participants and other parties before and after the think tank meetings had taken place, was expanded on further with the qualitative data in a sequential manner. I used the transcripts from the face-to-face interviews to collect data on:

- participants' views of knowledge
- the number, type and quality of the interactions participants had with others (observed in group meetings, and reported by participants from other contexts)

1.8   Significance of the Study

The study has implications for the structure and organisation of teacher PLD as we transition New Zealand schools to work effectively in the knowledge age. Collaboration is seen as an important factor by many educational researchers in creating a culture which enables transformational learning (Bull & Gilbert, 2012; Drago-Severson, 2004; Hargreaves & Fullan, 2012). Gilbert (2012) argues that, in order to provide the conditions needed for innovation, priority should be given to the opportunity for contact between people, in which negotiation and articulation of each person's contribution are placed as high importance. In order to shift thinking in a different direction and for teachers to be able to reconsider their role, they will probably need to work in collaboration with a wide range of people who can provide a variety of types of expertise as and when they are needed. Additionally, collaborative schools are thought to do better and make more informed changes than non-collaborative schools (Rosenholtz, 2000).

The results of this study demonstrated that members of the think tank did have more interactions as a direct result of the think tank sessions. Furthermore, these interactions were more likely to be directly related to education and based on educational research. Whilst only a small number of interactions were described as 'in depth' or 'deep', a larger number addressed the topics under discussion during the think tank sessions. Many of the interactions occurred outside the actual think tank sessions and it was noted that the regularity of the interactions increased in frequency over the course of the six months during which the think tank ran.

It was also found that members of the think tank tended to question their understanding of, and shift their views on, knowledge. That is, resulting from the think tank, participants appeared to have a transformation in the way they thought about knowledge. Participants' views of knowledge appeared to shift in three main ways:

	From the view that	To the view that
1	knowledge is something which is a constant and added to in a person	knowledge is something which can be created
2	knowledge is something people need in order to gain qualifications	knowledge makes things happen
3	knowledge is a thing in itself	knowledge as a kind of energy

These trends were found in all participants but stronger in some participants than others.

In addition, the data from the second interview suggested that the participants felt there was a need for teachers to adopt a more future-focused approach and many discussed a need for a reformation of the education system which they had not discussed in the first interview. This is a

possible indication of transformational learning as discussed by Berger (2007). Within the bounds of this study, it was not possible to measure whether each participant's meaning making system had actually undergone a shift, which would give a measure of transformational learning (Gilbert & Bull, 2015) but it was possible to measure a shift in views over the course of the study.

This research project concludes with a series of recommendations which relate to the positive impacts which appeared to result from the participant's involvement in the think tank. These recommendations are:

- set up conditions within which it is possible for PLD to allow for informed, robust discussion that can be sustained over long periods
- encourage diversity in collaboration
- engage an outside expert facilitator
- treat teacher PLD as a complex issue

Chapter Two: Literature Review

2.1   Introduction

This project is a study of teachers' understandings of knowledge as they participate in a collaborative think tank. In this review I will draw on four bodies of literature: future-focused education, teacher professional learning and development, complexity thinking and adult cognitive development. Initially, as an overarching focus of the project, I will consider the education futures literature (future-focused education) with an emphasis on the changing ideas about knowledge. The future-focused education literature calls for a total transformation in the schooling and education system. For this to be possible, educators would not only need to work in different ways but also think differently and see their role differently. The project focuses on one small part of the literature on future-focused education, that is the aspect of changing meanings of knowledge. The scope of the project does not enable a platform to work with other, perhaps more prevalent, literature on future-focused education such as digital pedagogies, modern learning environments and teacher/student collaboration.

The future-focused education literature calls for sweeping changes in the ways teachers work and think and the suggestion is that this cannot occur by merely telling teachers to think differently. To enable teachers to make the recommended shifts, many future-focused educationalists argue that teacher PLD must be reconsidered and overhauled. Underneath the umbrella of the future-focused education literature focused on changing views of knowledge, this project considers the body of literature about teacher PLD in an aim to demonstrate that:

1. A transformation of the education system, which includes major changes in the way teachers work and think about aspects of their work, is necessary
2. For this to happen, teachers need new forms of PLD
3. This PLD needs to enable informed, robust collaborations between teachers

The propensity for teachers to resist change is also widely documented, (e.g. Fullan, 2001; Fink & Stoll, 2005). Since this project considers a move from a traditional and known model of PLD towards a different model, it is expected that teachers may feel threatened by this change and that, when considering the body of literature on teacher PLD, resistance to change needed to be a consideration. Alongside this, the transformational changes expected of teachers are argued to be highly demanding and cognitively challenging (e.g. Gilbert & Bull, 2015) and consequently, an essential consideration is that of adult cognitive development. Therefore, the body of literature that considers strategies which enable transformations in adult thinking is also drawn upon for this study.

Whilst there have been changes to the education system over recent years, much of the education futures literature suggests that reforms to the system which have occurred over the last decade have resulted in schools looking for best practice methods of delivering education which may look more modern but actually hold the same values and purpose (Claxton, 2008).

Since the education futures literature suggests that reformation of an outmoded system will not be enough to ensure the public school system does not become a holding ground with no real purpose (e.g. Claxton, 2008; Egan, 2008), there is also a need to consider the way in which transformational change can be brought about within the system itself. The suggestion is that schools have been considered as either simple or complicated systems with no real consideration of their complexity. In a complex system, small scale changes can produce huge shifts in outcome and consequences of change are almost impossible to predict accurately (Snowden & Boone, 2007). Additionally, best practice or optimum conditions in one area may not produce the same outcomes in another area. Schools are increasingly seen as complex systems in which outcomes of change are becoming less predictable (Berger & Johnston, 2015). Consequently, the body of literature around complexity theory must also be a consideration, especially in viewing the impact of the intervention for this project. The body of literature on complexity theory is used as a lens through which to view the project. Without this consideration, it would be possible to fall into a trap of considering schools as complicated spaces in which best practice methods can be relied upon and advocated for.

2.2   Future Focus

Toffler (1970) attributed the experience of 'future shock' to a number of events occurring at the time which were leaving people panicked, unsure and confused. These events included: once valuable goods suddenly becoming disposable together with their design becoming outdated quickly, whole industries becoming diminished rapidly which meant that generations of workers and families who had once relied on a particular industry could no longer do so, people starting to be required to be life-long learners as knowledge became outdated rapidly and, consequently, people of this post-industrial society being expected to have many careers over their working lifetime. In looking for a distinction between an industrial society and a post-industrial society, Toffler (1970) proposed one measure: the proportion of the population occupied in the services sector versus the proportion occupied in physical work. He proposed that the proportion of people occupied in services is much greater than the proportion of people occupied in physical labour in a post-industrial society. Consequently, during this period of the late 20th century, additional to the major social, economic and political changes, came changes in ideas around knowledge, around how people viewed knowledge and how they used knowledge (Berger, 2007). This period has now become known as the beginning of the knowledge age, as distinguished from the industrial age. The events occurring in this post-industrial knowledge society of the time were bound to have implications for education and there has since developed a wide body of literature around the future of education. This literature has emerged under a number of themes including; a consideration of the skills needed for 21st century life, digital pedagogies, modern learning environments and the way we think about knowledge. Indeed, to some the term 'future focused education' has come to *mean* a consideration of some of these themes. I decided that of these themes, one of the major coniderations which would impact on the way teachers work everyday, would be the changing

way we use and think about knowledge. Since this is important to teachers' day to day work, I made this aspect of the future-focused education literature the emphasis of the project. Whilst this may be thought by some as a narrow consideration of the future-focused literature, it was thought likely to be one of the characteristics which is impacting on teachers current work and, therefore, be one aspect which could change in the short timeframe of this project.

The terms knowledge age or knowledge society are now well-known and refer to a reform of an industrial age economy where exploitation of natural resources, primary manufacture, mass production and bureaucratic management hierarchies were the standard model for economic development (Bolstad et al., 2012). The education futures literature suggests that major change is needed in our education systems if we are to adequately prepare today's learners for the knowledge age world (Facer, 2011; Gilbert, 2005; Hargreaves, 2003) and a strong message is being sent from educationalists that we need to transform rather than reform the current education system which was founded on an industrial model and has a long history of being a preparation for something else (e.g. K. Robinson, 2011). The current education system as we know it was developed in the late 19th century, during a period of change but unlike the scale of the exponential change we have seen in recent years. In this knowledge age, there is far greater volatility, uncertainty, complexity and ambiguity (VUCA) than experienced in any other period (Berger & Johnston, 2015). Education cannot be expected to continue as it is, nor can we keep the current model but add more technology or "smarter" ways of doing things (Claxton, 2008). Additionally, teachers who see themselves simply as the holder of important knowledge which they need to impart to others will not deliver the important skills needed in the 21st century (Fullan & Scott, 2014).

2.3   History

In order to gain perspective of why the current education system is organised in the way it is and why a transformation is needed to account for today's society, it may be useful to have insight into the history and development of the education system. For the purposes of this project, I will focus on how our understanding of knowledge and teacher PLD have developed over time in order to relate the historical aspects of the development of education to the research questions in this project.

The Education Act of 1877 laid a foundation that is still evident in the structure of today's education system in New Zealand. The act made schooling free, secular and compulsory. It also set controls on funding and teacher appointments under a Department of Education. These aspects came together with a public school curriculum with the main intent to provide total equality of educational opportunity (Jones et al., 1995, p. 33). The public school curriculum meant that each child should have had access to the same knowledge and this was seen as an important focus. The emphasis on the provision of equal opportunities in education for New Zealanders was strengthened by the election of the first Labour government in 1935. Since the provision of equal opportunities was not effective for some students who may have needed

special conditions in order to access the learning, during the 1970s there was a shift towards equality of outcomes rather than equality of opportunities, indicating that some students should be treated differently to produce equitable outcomes. Consequently, the concept of equality in education has been foundational for the national education system in New Zealand for over a century and there has been a strong focus on all students having access to the same kinds of knowledge. During the 1980s researchers (e.g. Mackenzie, 1984; Shuker, 1987) argued that the goal of creating educational outcomes and opportunities for all had not been reached and that education had become a means to secure and maintain social control. During this period, a new metaphor was developed; schools as enterprises providing a product to clients (Beare, 2001). The implications of this were that education became viewed by governments as a product and an exportable commodity and principals came to be viewed like CEOs. Additionally, differences in the ways teachers were employed and developed emerged with the evolution of new teacher career patterns. Beeby (1986) identified "three great educational myths" of this time, one of which was the myth of equality of opportunity through education, and he suggested that from the very beginning the schooling system had only two functions, one to educate and the other to select. In these terms, to educate related to imparting factual knowledge and selection was based on the ability of students to remember that knowledge and to repeat it under examination conditions. It was argued that this was not what the education system had originally promised and that the principles on which the education system had been built were not apparent (Beeby, 1986).

During the mid to late 20th century, it was argued that the actual organisation of educational institutions did not reflect the espoused purpose of schooling (Renwick & Beeby, 1986). Along with the passing of the Education Act, the rise of industrialism in the early 1900s influenced the organisation of mass education, and schools came to be organised like factories with set hours of operation and organisation by age group in set rooms. Schools were considered to be a preparation for something else. Moreover, disciplines were given a hierarchy with mathematics and science being placed above subjects like dance and drama (K. Robinson, 2011). The development of this hierarchy was mainly due to cultural ideas around knowledge and intelligence, ideas which have dominated thinking in education for over three hundred years and are seen in nearly every school in the world still (K. Robinson, 2011). It has been argued that this organisation of school culture was based on two principles, the economic principle, for example the belief that a country needs more scientists and any scientist will, therefore be in demand and easily gain employment and the cultural aspect arising from the requirements of universities (K. Robinson, 2011). In both of these cases, factual knowledge continued to be given high importance.

During the 1950s, young people with good qualifications from high school could expect stable employment and often stayed with the same company throughout their working life. In this knowledge age, few graduates have what employers say they are currently looking for, that is; creative thinkers who are team players, can communicate and are adaptable and self-confident (Bolstad, 2011). Gilbert (2005, p. 67), argues that since we cannot know what content we will

need for the future, there is no point in teachers trying to teach this in advance. More important is the ability of students to understand how to learn and how to become lifelong learners in collaboration with their peers; "specific bits of knowledge" are far less important as things in themselves than they once were. Along with this, society does have a responsibility to prepare our students for the future in whatever form that may be and to intervene to "tip the balance of socio-technical change in the direction of sustainable, equitable and positive futures for their communities" thereby creating future-*building* rather than future-proofing schools (Facer, 2011, p. 104).

2.4   Moving Forward with a Future Focused Model

2.4.1   Future-Focused Education – what is it?

The term 'future-focused education' can take on a number of meanings (Bolstad, 2011). The issue of thinking about the future of schooling, teaching and the curriculum is one aspect of thinking about future-focused education. Others include thinking about the future lives of our students and preparing students to deal with future-focused issues. Thinking about the future of schooling, teaching and the curriculum is most relevant to this project and so I focus on that aspect of future-focused education. Further threads running through the future-focused education literature include the importance of connections between people, a shift in the role of teachers, and changing views of knowledge (e.g. Egan, 2008; Gilbert, 2012; Leadbeater, 2011; K. Robinson, 2011). These three themes also have implications for this study and I will expand on the them to a limited extent later in this literature review. For the project as a whole, I place the largest emphasis on changing views of knowledge since this is the aspect of teacher thinking which I decided to investigate in the study group. It was decided to focus on teachers' changing views of knowledge for two main reasons. Firstly, the think tank group had shown an interest in this aspect of future-focused education and were prepared to consider this in their meetings. Secondly, I hypothesised that a teacher's view of knowledge would likely impact on their day to day work and, therefore, possibly be one aspect of adopting a more future-focused approach which could take place in the short timeframe of this project.

2.4.2   What changes do Future Focused Educationalists say are needed in our current situation of schooling, teaching and the curriculum?

Future-focused educationalists (e.g. Claxton, 2008; Egan, 2008) are calling for change and many have argued, over that last two decades, that educational thinking is flawed and that "even on its own terms, education is hardly a success" (Claxton, 2008, p. 16). Egan (2008) argues that the very ideas behind education are in opposition to each other and that the aspects which have become reasons for schooling, namely socialisation, shaping the mind and developing potential, combine to weaken rather than strengthen the effectiveness of the education system.

Many future-focused educationalists (e.g. Beare, 2001; Bolstad, 2011; Facer, 2011; Gilbert, 2005) argue that the production line model of education is no longer useful and suggest that there should be far greater multiplicity and diversity. Gilbert (2005) calls for new metaphors in education which replace those of the industrial age model with a move away from a segmented, hierarchical and bureaucratic system towards a more egalitarian approach which befits the world in which we live. Bolstad identifies three ways of interpreting future focus in education (Bolstad, 2011). These are: thinking about students in their future lives, the future of schooling in teaching curriculum and preparing young people and communities to deal with future focused issues. Bolstad (2011) suggests we will require new ways of working which enable us to move forward together with the social and intellectual revolution which is taking place worldwide. Whilst it is true that history has taught us that a transition from one intellectual age to another can be demanding; and research (e.g. Fullan, 2001) shows that substantive change in the way teachers work is often resisted, the expanding literature on a need for a *transformation* in the education system cannot be ignored (Claxton, 2008) and a consideration of schools as complex systems must be a part of that (Berger & Johnston, 2015). The continued expansion of specifc bits of knowledge out of context of any real world considerations will not enable teachers to help their students develop the skills needed in the 21st century (Fullan & Scott, 2014). Teachers must rethink what knowledge now means and how a new meaning could help learners progress in the knowledge age (Gilbert, 2005).

Into the 21st century, schools continue to prepare students to participate in a workforce organised to serve industrial age needs (Claxton, 2008; K. Robinson, 2011). As we continue to move through a period of intellectual revolution, it is argued that we cannot continue with this model and its corresponding 'one size fits all' approach to education and schooling (Gilbert, 2005; K. Robinson, 2011). Claxton, (2008) maintains that schools are failing as a result of the determination to continue with an industrial model which does not relate to the world in which we now live. He notes that in UK schools, literacy and numeracy levels of school leavers are low, truancy rates are high and that, from surveys, the least likely thing to happen in a classroom was learning things that related to the real world. If, as Oliver (1998, p. 300) suggests, education is to engage "the reason of the learner so they come to act for their own reasons" then education must relate to the real world in which we now live and schools must be treated and behave differently. Specific bits of knowledge delivered out of context are unlikely to help 21st century learners develop (Fullan & Scott, 2014). The changes we need are likely to see teachers thinking and working in different ways, treating knowledge differently and having different ways of thinking about their role (Gilbert & Bull, 2015).

In *Intelligence in the Flesh*, Claxton (2016) suggests that schools have become "de-somatised" institutions where things are talked about, rather than the talking being part of the actual learning. He notes that abstract subjects like mathematics continue to be given higher credence than subjects which require intuition and creativity, for example, drama and dance. Claxton has observed that, even in modern schools, the more the body is needed in a subject then the lower

down the hierarchy a school subject sits. Consequently, he argues, intuition has become unimportant in education. Claxton concludes that this is an issue in the knowledge age since, unless an embodied view of intelligence is embraced, it is not possible to fully consider the complex problems the world is facing; intuition is an important part of thinking and only through discussion and intuition can we move forward. Claxton (2016) suggests that the storage of specific pieces of knowledge within a person is unlikely to enable the type of innovation the world now needs. Whilst this has importance in a school situation for students, the same argument can be translated to adult learners including teachers. An embodied curriculum could bring about the transformations in thinking needed from both students and teachers.

A variety of further themes and ways of interpreting future focus emerge from the education futures literature which describe the changes needed for education to be effective in the knowledge age. There is more than one way of interpreting future focus in education (Bolstad, 2011). As mentioned earlier, one interpretation is "thinking about students in their future lives" which requires us to consider new ideas about learning in the 21st century, moving away from traditional ways of thinking about knowledge and towards foci on key competencies and 'learning to be'. Another interpretation of future-focused education is a consideration of how schooling is changing and how this impacts on the school curriculum including personalising learning (e.g. Leadbeater, 2011; Gilbert, 2005). Gilbert and Bull (2015) summarise how the educational futures literature identifies a number of 'mega-trends' which are important in considering the need for change in education. These trends include: the digital revolution, globalisation, networked forms of knowledge, demographic and economic changes and the advent of the Anthropocene. Further themes running through the future-focused education literature, which are of importance to this project, include: addressing what we mean by intelligence in the 21st century and the view that 21st century education will require us to rethink our understanding of intelligence (K. Robinson, 2011) which in turn has implications for what we understand by knowledge.

2.4.3   What do Future-Focused Educationalists say about intelligence?

Research by Fullan and Scott (2014) suggests that leaders in the 21st century are tested not when things are going smoothly but when things go awry. It is at these times that successful leaders emerge as those people who do not rely on information that they know but rather they have the ability to collaborate, listen and diagnose. These people are capable of understanding the right mix of knowledge and skills needed to solve a problem. Therefore, it is likely that, into the 21st century, those people who are seen as intelligent will be able to demonstrate a range of soft skills. Fullan and Scott (2014) identify six skills which they term the 'six Cs of deep learning'. Whilst traditional thinking about intelligence was focused on a person's recollection of facts and how they use these facts to solve problems (K. Robinson, 2011), as we move into the 21st centrury intelligence is expected to be viewed in a different way.

Claxton (2016, p. 138) notes that human intelligence is customarily connected to certain activities. These activities possess some or all of a range of characteristics. The characteristics are: they may involve the use of language (articulation), they may be abstract, they may involve reasoning and analysis (that is, they may be rational), they may be conscious and deliberate and they may require effort. In an attempt to measure this level of intelligence within a person the 'IQ test' (the Stanford-Binet Intelligence Scales) was developed in 1904, by Alfred Binet (1857-1911) and Theodore Simon (1873-1961). This test became the most popular test in the United States for decades. Whilst the IQ test measured cerebral thinking including spatial recognition and mathematical ability, Claxton, (2016) draws on neuroscience and psychology to discuss the importance of the body in considering a person's intelligence. This connects with the work of Fullan and Scott, (2014) in that the 'six Cs for deep learning' include collaboration, communication, creativity, character and citizenship all of which can be thought of as embodied traits. The sixth C, critical thinking, was in the past, thought of as the major aspect of intelligence. This focus on cerebral thinking, Claxton (2016) suggests, has taken a toll on modern life and left us with the belief that services labour is far more important than craftsmanship and blue-collar work. This has resulted in a devaluation of craftsmanship and skilled labour. K. Robinson, (2011, p. 108) argues that human capacity is far more than a high IQ and suggests that we need to see through the "academic illusion" which centres on the belief that academic activity is the only measure of intelligence.

These views have implications for teacher PLD which I will discuss later as part of this project. Additionally, the suggestion that we should rethink our understanding and measurement of intelligence has other implications for our views on knowledge (Renwick & Beeby, 1986).

2.4.4   Future-Focused Education and changing views of knowledge

Changing views about what we mean by 'intelligence' would suggest that alongside the need to re-think our ideas about how our learning systems are organised, resourced and supported, there is a need to consider what we now mean by knowledge (Gilbert, 2005). Whilst knowledge was once the sole province of philosophers, the question 'what is knowledge?' has now long been debated by not only philosophers but also academics and scholars. Plato defined knowledge as *true belief*. Since beliefs can be proved false (consider the belief in a flat earth), many other solutions have been suggested for what true knowledge really means. The empiricists view that "to know was a matter of observation, correct remembering and application" (Pernecky, 2016, p. 42) dates back to ancient times but scepticism regarding the reliability of the senses called this definition into question. Therefore, the definition of knowledge has been a continuing debate for philosophers and, since the debate has been longstanding and spread over many disciplines and cultures, educationalists do not have a distinct definition of knowledge. It is argued, however, that educationalists do discuss knowledge widely and make an effort to link it to education *as though* the definition and connection is clear (Gilbert, 2005). For most people, the definition of knowledge in recent years was straightforward; knowledge was a collection of true facts accumulated over time, and organised into disciplines by experts in that discipline. Knowledge was able to be stored and built up by and in people, almost like knowledge being the contents of a mental filing cabinet

(Bereiter, 2002). In schools, knowledge was subdivided into discipline areas and teachers were expected to be specialist knowledge holders in particular areas, able to pass their own bank of knowledge on to their students (Beare, 2001). Scholarly work over the last two or three decades is showing a shift from this view of knowledge as 'stuff', able to be acquired and stored, to a view of knowledge as more like a kind of energy, something that drives other things to happen (e.g. Castells, 2000).

The "knowledge doubling curve" identified by Buckminster Fuller (Fuller, 1981) indicated that until the end of the 19th century, knowledge doubled every one hundred years, but by the end of World War II, this doubling was occurring every twenty-five years. The latter half of the 20th century was characterised by discussions of the 'information explosion', but now, almost two decades into the 21st century, knowledge's growth is incomprehensibly fast (Brynjolfsson & McAfee, 2011). The result of this is that it can no longer be thought of a stable, masterable body of truths: rather it is networked expertise – it exists, and is created and replaced, in the network, in collaborative, connected groups (Weinberger, 2011). Outside of the realm of education, the definition of knowledge has changed. The word is viewed as a verb rather than a noun, knowledge makes other things happen and, rather than being stored within people, knowledge is something created in the spaces *between* people (Gilbert, 2005, p. 76).

It was not only in recent years that the value of the delivery of knowledge as a collection of true facts in schools has been questioned. As early as the 1930s, John Dewey (Dewey, 1938) discussed the need for education to prepare people for the huge changes ahead and envisaged knowledge as something which should be constructed within people, considering real world situations through processes of inquiry. Dewey advocated for 'active thinkers' which, he said, could not happen by students being given access to bodies of already existing knowledge in order to expand their minds with pre-existing pieces of information. Dewey encouraged teachers to undertake the setting of problems through open-ended projects which related to real experiences and for all and for learning to involve a construction of new knowledge through active inquiry. Dewey's thinking around knowledge was criticised and viewed by some as undermining teachers. Consequently, it is argued that the changes in knowledge described above have, as yet, had minimal impact on schools or on educational thinking (Gilbert, 2005).

Additionally, there has been some recent work (e.g. Rata, 2012) to suggest that when we focus on knowledge which comes from experience, the knower is limited to that experience. Rata (2012) argues that disciplinary knowledge is being pushed aside in favour of competencies and values based on experience and that this social constructivist view of knowledge limits the working class to their current reality and holds them there. Rata (2015) expands on this and links experience to the increase in knowledge. She argues for a "pedagogy of conceptual progression" (Rata, 2015, p. 169) in schools which brings together context-dependent knowledge relating to experience and the knowledge driven by an academic subject which requires no context. Therefore, experience becomes important but does not serve as the actual knowledge itself.

Current thinking around the role of knowledge within education reconsiders the views of Dewey. It is argued, (e.g. Bolstad et al., 2012) that education for the knowledge age must place the highest importance on the development of learners' capabilities to deal with new situations and environments, including those with high degrees of variability, uncertainty, complexity and ambiguity (Berger & Johnston, 2015). In the knowledge age, it is thought to be the rapid creation of new knowledge which has become the basis for economic development, since this provides an opportunity to generate value through innovation (Sardar, 2010). The future-focused education literature suggests that we need to adopt a much more complex view of knowledge, and understand how to show people how to do things with knowledge and generate new knowledge (e.g. Gilbert, 2005).

Claxton (2016) defines knowledge with which we can do things "working knowledge". According to Claxton (2016, p. 227) there is a general belief that where knowledge is applicable to concrete situations, it is recognised with less prestige and it is assumed the user of such knowledge would need less intelligence than a person using knowledge purely for academic purposes. Claxton's (2016) discussion of the embodied point of view notes that the ability to explain why something works may not always be useful. He gives examples of top musicians, athletes and gardeners who do not necessarily need the factual knowledge of their craft to excel.

Whichever view of knowledge is considered, whilst knowledge and learning were formerly the territory of education, the argument that they are now part of our everyday lives is difficult to deny (Gilbert, 2005; Hargreaves, 2003). We live in a knowledge-based society and 'knowledge' is regularly used as a prefix in the media, business and government. Knowledge society, knowledge workers, knowledge revolution all give knowledge a new meaning. Therefore, knowledge, in the 'knowledge societies' of the late 20th and early 21st Centuries, has moved out of the educational or academic sphere: it is now seen as *the* key driver of growth in the new "weightless" economies (e.g. Leadbeater, 2000a, 2000b), and its production is now a key focus of business and government (e.g. Biesta, 2013; Gilbert, 2005; Hargreaves, 2003). This has enhanced the debate amongst educationalist about how knowledge and education are now related. Some would suggest that, whilst its mission is to prepare students for the future, education is backward focused and that we can only teach students what we already know (Evans, 2012). Young (2014, p. 11) argues that "knowledge is an uncomfortable word in education today". He suggests that people treat knowledge either as something for the realm of philosophers or the simple transmission of facts from one person to another. Whilst Young (2014) argues for the right of access for all students to "powerful knowledge" which enables students to think critically and without which they would not be able to make sense of the world, Gilbert (2005, pp. 76–77) states that the old version of knowledge is "still important but not an end in itself". She maintains that "we have yet to refocus our schools so that they see their core activity as building capacity for knowledge production".

Taking either view, many of the future focused educationalists mentioned here agree that changes are needed to traditional conceptions of knowledge and its purpose in educational contexts. Even considering Young's (2014) view of the right of access to "powerful knowledge" in "future 3 schools", he accepts that the reason for this access is to enable students to think critically and to solve problems. Instead of, or in Young's argument along with, "delivering" existing knowledge to students, it is argued that educators should be scaffolding students' ability to *use* existing knowledge to create *new* knowledge. There is now a large literature on the implications of this shift for *students*, for *curriculum* and for *pedagogy* (e.g. Claxton, 2008; K. Robinson, 2011), but as yet very little work has been done on the implications of this shift for *teachers* and their thinking. In the next section, I consider the work which has been done on the implications of the shift for teachers; this project is designed to contribute to this work and considers how interactions between groups of teachers can impact on their views of knowledge and education.

2.4.5   Future Focused Education and the changing role of the teacher

Educationalists (e.g. Claxton, 2008; K. Robinson, 2011) maintain that effective teaching for the knowledge age is very different from the traditional "spoon feeding" approach of the industrial age and that we need to be very clear about how the two differ. Summarising the findings of several different studies, Claxton (2008) notes recurring themes of students being given knowledge as facts and memorising answers and, it is suggested, not being expected to think for themselves. Bolstad (2011) suggests a different approach in which learners are equipped with the skills needed to tackle the world's "wicked problems"[1] (Rayner, 2006). To aid this, Bolstad (2011, p. 15) proposes a change in schooling which sees "many opportunities for teachers and learners to co-construct meanings and practices associated with the future focused issues that are personally relevant". Bolstad also advocates for support for schools to be recognised as sites where the world's wicked problems can be addressed. This, she argues, will require teachers to think and work in new and different ways.

As discussed in the previous section, if we are to consider equipping our learners with the skills needed to solve problems which characterise the world in the 21st century, of importance in the transformation is a requirement to rethink what we mean by intelligence (e.g. Pinker, 2016; K. Robinson, 2011). This redefinition of intelligence is also highly likely to have implications for the role of the teacher. Egan (2010) recognises the need for learners to have an understanding of the role played by the intellectual tools available in the society in which the learner is currently living. He suggests the need for teachers to look for tools that generate common kinds of understanding in both cultural and educational development for the present time in order to ensure appropriate context. It is argued (e.g. K. Robinson, 2011) that our existing measures of intelligence centre on either IQ, which assumes a person is born with a fixed intelligence; or

---

[1] A wicked problem in this context refers to a problem which is difficult to solve partly because of the quickly changing environment. Wicked relates to the resistance to change rather than something which is evil.

good memory which centres on recall of factual information. K. Robinson (2011) maintains that we need to ask new questions and change the basis on which questions around how we measure academic success are framed. According to Robinson:

> To educate people for the future, we must see through the academic illusion to their real abilities and to how these different elements of human capacity enhance rather than detract from each other (p. 87).

Bolstad et al. (2012) advocate for teachers to adopt a system of personalising learning in 21st century schools in which learners need to be active participants in their own learning; requiring the learning system to be built around the learner as opposed to the learner fitting into a system. It is not suggested that teachers should yield all power and responsibility to learners but it does mean that we have to consider very carefully the role of the teacher and the importance of the ability of the teacher to meet the learners' needs. Personalised learning requires a restructuring of the relationships and the roles between teachers and learners with a focus on learners gaining the skills and knowledge they need for the knowledge age. This structure would be a move away from teachers holding factual knowledge and passing that on to their students.

If we are to facilitate these changes, it is argued that there is a need to see a substantive shift in the actual role of the teacher (Drago-Severson, 2012). It has been noted, however, that teachers have a propensity to resist change (Fullan, 2001; Fink & Stoll, 2005). Nevertheless, these educationalists agree that there has to be a shift in the way we educate young people if we are to prepare them to be useful citizens in today's ever changing world. For that to happen, teachers will have to change their practices, the way they work and the way they think (Fink & Stoll, 2005). Zimmerman (2006) asserts that teachers can easily feel threatened by change. They may perceive that their expertise, social relationships, power relationships and/or resource allocations are all under threat during periods of change. Evans (2012) notes that the norm for teachers is one of autonomy and privacy in their practice and that this is the state at which most teachers feel comfortable. Hood (2001, p. 50) remarks that "secondary teachers are trained to be subject experts, rather than experts in learning. Their confidence is dependent on teaching their subject".

Additionally, Fullan and Crevola (2006, p. 8) describe the "prescription trap" in which leaders of change prescribe methods which may take effect in the short term but are usually short lived. Nevertheless, future-focused educationalists (e.g. Gilbert, 2005) argue that twenty-first century learners need access to expertise which is different from the past model where the teacher was the holder of knowledge which needed to be imparted to the learner. The 21st century model of education is likely to involve groups of people working in collaboration with each other to use their knowledge in order to solve problems (e.g. Gilbert, 2012). This is a major shift for most teachers.

The discussion of connections and collaboration, both within educational establishments and across whole communities, features prominently in the educational futures literature. Gilbert

(2012) discusses a need for connections between people in which negotiation and articulation of each person's contribution are vital and the creation of the conditions needed for innovation should be a priority. It is highly likely that educators into the 21st century will need to work in collaboration with a wide range of people who can provide a range of types of expertise as and when they are needed. For each educational establishment, the whole community will likely be needed for support (e.g. Egan, 2008; Leadbeater, 2011). This is a change from traditional practice.

The benefits of a collaborative culture have been recognised by the Ministry of Education in the Education Amendment Act (2017) in which a focus is "enabling Kāhui Ako (Communities of Learning) to work together more collaboratively". The Ministry have demonstrated a commitment to supporting the collaborative opportunities available to the growing number of Kāhui Ako across the country. Hargreaves and Fullan (2012) argue that, whilst teaching is, for many, still an individual occupation, there is power in what teachers can draw from their group given the right set of circumstances. Hargreaves and Fullan maintain that diverse groups, where members can bring different insights and capabilities, create the best growth in teachers and encourage collective responsibility. The members of these collaborative groups enjoy challenge and are prepared to question and challenge each other when a problem is identified. It is suggested that this leads to a shared understanding of purpose but, more importantly for this project, it is thought to lead to challenging learning which is mutually understood.

The mere formation of communities of learning and the provision of opportunities for discussion or collaboration are unlikely to be sufficient to support teachers to investigate the sweeping transformations advocated. Additionally, it is suggested that collaborative groups must have a collective purpose driven by the members of the group rather than the school administration (Hargreaves & Fullan, 2012). Bull and Gilbert, (2012) describe a new way of working for teachers which befits learning in the 21st century in which educational professionals communicate and collaborate in groups, both within and across establishments, with the aim of supporting teachers' cognitive growth and thereby sustaining innovation. "Changing the script" (Bolstad & Gilbert, 2012, p. 39) for teachers involves the development of a culture where continuous learning for teachers is expected and where teachers from a range of learning areas and schools join forces to innovate, rather than reform and use current research to make advancements within schools. This project considers the impact on the thinking of a group of teachers from different areas of a school by enabling collaboration and facilitated research.

One aspect of "changing the script" for teachers is the need for teachers to reconsider their role, not as a giver of knowledge but as a facilitator in enabling learners to understand how to do things with the knowledge they have. This requires new ways of thinking about knowledge (Gilbert, 2005). Additionally it is argued that teachers, especially secondary school teachers, should reconsider their work practices to enable them to work in cross-curricular teams or syndicates which would give the opportunity to plan units of work which relate to real world contexts (Gilbert, 2005). It is unlikely that teachers will make these substantial shifts without support and transformative professional learning opportunities (Bolstad & Gilbert, 2012). The

focus on what is known, rather than how it is known, which has shaped teacher PLD in the past is unlikely to be sufficient for teachers in the knowledge age (Gilbert & Bull, 2015).

2.5   New Forms of PLD

2.5.1   Transformational learning for teachers

The expectation of a 'transformation' and the requirement of 'transformational' thinking and learning recur commonly in the educational futures literature (e.g. Beare, 2001; Claxton, 2008). These terms have been found to be commonly used without a clear expectation of what they actually mean or require (Gilbert & Bull, 2015). Drago-Severson (2007) discusses transformational learning within a person as an increase in cognitive, affective, intra- and inter-personal capacities that enables them to better manage the complexities of the 21st century. Transformational learning is distinguished from informational learning in that informational learning refers to an increase in what we know. It is argued that, unlike transformational learning, informational learning does not change the way a person sees the world, nor does it enable a person to deal with the adaptive challenges we face in our ever changing and highly complex society (Kegan, 2000; Drago-Severson, 2007). Informational learning of knowledge, Kegan (2000) argues, merely adds to the facts which have built up in a person over time and does not transform thinking.

Educationalists suggest that, currently, many PLD programmes for teachers in schools centre on knowledge and skills, that is there is a focus on informational learning and whilst these aspects may have some impact on teachers' thinking they are usually not enough to produce changes in actual practice (Timperley, Wilson, Barrar & Fung, 2007). Additionally, imposed educational reform with no real dialogue or survey of the opinions of educators has been found to produce frustration and resistance (McGee, 1997, p. 223). One aspect of this is thought to centre on the leadership of PLD for teachers. V. Robinson (2011, p. 27) describes three capabilities of leadership, one of which is "solving complex problems" and she suggests that leading PLD in the current climate is, in itself, a complex problem. V. Robinson (2011) proposes that, in order for implementation of an idea to be successful, the identification and satisfaction of the conditions which need to be met are necessary. A suitable way to identify the conditions is to "discuss the idea with those who will be responsible for its implementation" (V. Robinson, 2011, p. 28). A leader who is unwilling to "initiate and engage in critical conversations with individuals and groups even when the topic is unpopular" (Santamaria & Santamaria, 2012, p. 22) would not be able to create the atmosphere necessary to identify the conditions needed for change. Leadership practices which do involve engagement in critical conversations are transformational. That is, they aim to "destroy old ways of life and make way for new ways" (Santamaria & Santamaria, 2012, p. 3). Further, failing to involve educators in the decision

making process around reform is thought to deny them the opportunity to develop a vision (Kotter, 2006). Jackson and Davis (2000) note that:

> high-quality professional development builds a culture among educators…that supports innovation, experimentation and collegial sharing (p. 23)

2.5.2   Collaborative PLD for teachers

Fullan (2001) argues:

> We are more likely to learn something from people who disagree with us than we are from people who agree. But we tend to hang around and overlisten to people who agree with us, and we prefer to avoid and underlisten to those who don't. (p. 41)

Also, Evans (2012) suggests that learners in the 21st century should be able to work with people from diverse backgrounds and perspectives and if educators are to be able to help learners achieve this, they themselves must be able to model this behaviour in the way they go about their own practice. Much of the current research (e.g. Gilbert & Bull, 2015; Santamaria & Santamaria, 2012) focuses on the need for teacher PLD to facilitate collaboration and debate. Gilbert and Bull (2015) maintain that if the new forms of PLD are to drive changes:

> teachers need more opportunities to participate in sustained collegial debate, to engage with ideas at a deep level, beyond what is possible in the congeniality of staffroom conversations and to be comfortable with uncertainty and not knowing (p. 12)

This type of ethos was described by Hargreaves and Fullan (2012, p. 113) as a "collaborative culture" in which uncertainty is discussed between teachers with the aim of gaining support. Of importance here is the "professional capital" literature. In this literature, professional capital is seen as being built via strategies designed to build social capital, which is defined as the extent to which the quantity and quality of interactions between people affects their access to knowledge, and their ability to contribute to wider social goals (e.g. Hargreaves & Fullan, 2012). In such a collaborative culture, disagreement, within certain limits, is encouraged and new ideas are shared and developed. Where collaborative cultures are apparent, collective responsibility encourages dedication and hard work from the staff and there is often a sense of pride in the school.

Drago-Severson (2004) identifies "four pillars" as a model to support adult cognitive development. Two of the four pillar practices are "teaming" and "engaging in collegial inquiry". She suggests that professional growth and development for 21st century educators can only be effective if in a collaborative environment. According to Weinberger (2011, p. iii), in the knowledge age, "the smartest person in the room is the room" suggesting, not that the answers are already in the room, but that answers to complex problems could be found, but only if there are high quality multiple interactions between people in "the room".

The impact of high quality collaboration is described by Rosenholtz (2000, p. 37) who defines two types of schools: stuck and moving. In "moving" schools, teachers sought support and

advice from colleagues and any school improvement was seen as a collective achievement. "Stuck" schools saw teachers working autonomously, afraid to ask for the help and support of their colleagues and congratulating themselves, rather than the collective, when they perceived advancements were made. In accordance with a collaborative culture, Santamaria and Santamaria (2012, p. 4) outline critical pedagogy which is concerned with ensuring meaningful dialogue which is possible between members of a learning community to enable new knowledge to develop. The practice of critical pedagogy questions how an individual's identity may impact on their ability to appreciate alternative perspectives, an essential attribute for a teacher who is aiming to work in true collaboration with their colleagues. Whilst disciplinary conversations are regular in some schools, Gilbert (2005, pp. 206–210) recommends that all secondary school teachers consider a change of practice to enable them to:

- work together in syndicates which function across the disciplines
- consider a timetable which allows cross-disciplinary collaboration
- form networks of community contacts in order to facilitate new ways of practice more suited to the knowledge age

2.5.3   Cognitive change through teacher PLD

Gilbert (2005) argues that if future-focused schooling is to incorporate a different view of personalised learning and the understanding of the importance of knowledge in the knowledge age, then teachers in a future-focused schooling system are likely to need to modify their view of these aspects before they can consider how this will impact on their practice. Without a cognitive change teachers will, at best, be using new words and assimilating them back into their existing meaning making system and things will continue much as before; to avoid this a paradigm shift in thinking is needed. Through teacher PLD, teachers need to be given time in collaboration with others to consider how these changing definitions will impact on their teaching practice (Gilbert, 2005).

Taking the view that schools have become more complex systems and that exponential changes in society have led to a need for the role of the teacher to be widely different from the traditional role, there has to be implications for teacher PLD if effective changes are to be possible (Gilbert & Bull, 2015). PLD for the knowledge age is likely to be cognitively challenging, to require significant support from communities of colleagues and to require participants to *change their minds* as well as changing their practices (Berger, 2007). This kind of transformational learning involves changing the structure of a person's meaning making system (Gilbert & Bull, 2015). That is, the subjects are not changing *what* they know necessarily but *how* they know. All of this is reliant on the ability of the participants to expand their thinking (Berger, 2007). There must be a consideration of adult cognitive development if we are to ensure changes are not short lived and superficial.

Within the adult population, it is noted (Berger, 2007; Claxton, 2016; Kegan, 1994) that there is a wide variation in the modes and complexity of peoples' thinking. Kegan, (1994) describes

ways in which some adults grow and change over time more than others which results in some becoming further along than others. Those who are further along have more complex, more multifaceted meaning-making systems. These adults have more capacity to grow and change more over time and Kegan (1994) describes these individuals as having "self-transforming minds". Kegan suggests that more adults need to work to develop a "self-authoring mind" which may in some people lead to a "self-transforming mind" thereby enabling some adults to understand others' perspectives and to see and manage complex problems.

Kegan (1994) proposes that a person's experiences and opportunities through childhood usually enable movement form the "magical" childhood mind towards the "self-sovereign" mind and then on to the "socialized mind" during adolescence. Some adults may continue on to develop a "self-authoring" mind. The development of a "self-transforming" mind during adulthood is achieved by few people and is a slow process which is usually uncomfortable. Berger (2007) notes that most people need high levels of support and the right conditions to achieve this. Consequently, at best some adults settle into a "socialised" mind and, whilst this might have once been acceptable, in order for people to flourish in our postmodern world, we need to give people the tools to enable a "self-authoring" mind. Additionally, Berger (2007) proposes that industrial age thinking *required* many people to have socialised minds; that is people who would be unquestioningly loyal to a company, who would do as they were instructed and work hard regardless of their position within a company.

This links to discussion from Fullan (2011) regarding McGregor's Theory X and Theory Y of human motivation in the workplace. Theory X assumed humans have a dislike for work and so need controlling and directing whilst Theory Y adopted the view that if the job is satisfying there will be commitment and imagination and creativity will grow. Kegan (1994) in a similar argument, related a person's mindset to their whole life rather than singling out the workplace. He suggests that the movement through the five orders of mind (magical, self-sovereign, socialised, self-authoring and self-transforming) requires a person to consider aspects which they have not previously questioned and expose them as available for inspection, that is make them "object", in that way, he proposes, new thinking could emerge regarding aspects of life which were once considered "normal" or "the way things need to be". Kegan (1994) notes that this process is likely to be uncomfortable for most people since its personal nature is likely to push a person outside of their comfort zone and possibly become destabilising. This process is very different to teaching a person new facts or ideas.

Constructivist learning theorists (e.g. Strike & Posner, 1985) argue that simply adding new ideas to an existing schema does not change the schema. They suggest that new ideas are assimilated into an already established meaning making system and, when that is not possible or too uncomfortable, new ideas are rejected and old habits and processes are maintained. Transformational new thinking, they argue, is needed about education's purposes: about curriculum, pedagogy, the role of students, and the role of teachers. For teachers to participate in this, Strike and Posner (1985) suggest we need new forms of PLD which encourage this type of thinking. Many educationalists (e.g. Berger, 2002; Timperley et al., 2007; Gilbert & Bull, 2015)

note that just as 21st century learners need more than simple content delivery, *so too do teachers*. Oliver (1998) argues that teachers need to be equipped to guide learners to think critically and that, if this is to be the case, a genuine educational commitment to teacher preparation and professional development is needed. He suggests that an educational commitment involves inquiry about human flourishing, engages the learner and involves understanding which is connected in a cognitive perspective.

2.5.4   The Importance of complexity thinking when considering new forms of teacher PLD

Nevertheless, all of this will likely require a substantial shift; a shift in methods, in habits, in practices and possibly most challenging and most importantly, a shift in thinking (Timperley, 2011). To enable this shift, Timperley suggests that busy teachers in schools worldwide are likely to be expected to embrace new philosophies, systems and methods on top of their already demanding workload. It has been noted that, with the evolution of the knowledge age, teachers have become swamped by innovations. Also, it is suggested that many educators have become resistant to change and addressing resistance is one of the greatest challenges leaders face (Timperley, 2011). There are many complex aspects for consideration in order to address this conflict. It is important for change managers to have an understanding of the reasons behind change resistance. For example, many schools function on a reputation of good roles and relationships and a "quest for stability has become an excuse for immobility" (Fink & Stoll, 2005, p. 18) which creates "structural inertia" (Robbins & Robbins, 1993). Zimmerman (2006) notes that teachers may feel threatened by change, perceiving that their expertise and power relationships are under threat. Additionally, imposed educational reform with no real dialogue or survey of the opinions of educators has been found to be short lived, producing frustration and resistance (e.g. McGee, 1997). The result of this is often an "implementation dip" (Fullan, 2001). The importance of teacher PLD during periods of change has been well documented but more is needed than simply telling teachers how to change; Riley (2003, p. 3) asserts that school leaders looking to reform teaching and learning must provide "a climate in which teachers take responsibility for their own professional development and are given the opportunities to think, reflect and take action".

It is argued that without the consideration of the complexity of the school system, and especially how that may be related to resistance to change, reform is unlikely to embed (Fullan, 2001). Therefore, important to consider in the approach to this project is also literature around "complexity thinking" – in which schools are seen as complex systems made up of, and defined by, the interactions between the system's elements (e.g. Berger & Johnston, 2015). In an attempt to build a foundation for conceptualizing the complex processes involved, Opfer and Pedder, (2011) build on the work of researchers who support a more dynamic consideration of teacher professional learning and development. These rather abstract ideas do not, however, mesh easily with established research paradigms and Opfer and Pedder, (2011) attempt to bring together the fragmented strands of literature which exist in this field. They depend on complexity theory to identify intersections of systems within a number of different components of research.

Educationalists who look for best practice ideas and ways of working, have often not considered the complexity of the education system and even of individual schools themselves (Berger & Johnston, 2015). Under many definitions of complexity, schools are complex systems and, therefore, new ways of doing things should not be based on best practice, there is a need for transformation as opposed to reformation (Robinson & Aronica, 2016) in which the complexity of the system is carefully considered. For these reasons, in this project, schools are considered as complex systems and complexity is seen as an important tool in assessing the impact of the think tank and its implications for moving forward.

2.6 Schools as Complex Systems

2.6.1 How does complexity relate to the changes suggested for the schooling system?

The Cynefin framework (Snowden & Boone, 2007), which is a sense making model, describes two domains; the ordered and the unordered. The literal translation of the Welsh word Cynefin is 'habitat' but it can also be viewed as meaning the 'place of a person's multiple belongings'. The translation is relevant to this project since there are many different aspects to a teacher's working environment which all contribute to their beliefs and assumptions as an educator. The ordered, or known, world is divided in the Cynefin framework into two domains; simple and complicated. Berger and Johnston (2015) suggest that leaders often find the complicated domain the most comfortable to work in since this is where there is a repeatable connection between cause and effect. Consequently, best practice strategies can be relied upon. Therefore, these authors suggest, school leaders often try to work in the complicated space when they are, in fact, working within a complex system. This could be dangerous since complicated spaces work very differently to complex spaces and as Fullan (2011, p. 131) points out, "complexity may defeat you in some circumstances but it will always defeat you if you ignore it". In the complicated space, actions are predictable and repeatable; when we are not sure why, we need experts to help us. There is opportunity for discussion and debate but good practice brings about predictable results. Berger and Johnston (2015) suggest that it is likely that deep change will never be possible within education if leaders continue to treat schools as complicated rather than complex systems. Leaders who understand the complex space are able to put aside the need for certainty with actions, they look for diversity in thinking, they listen to learn and they are inclusive and collaborative (Berger & Johnston, 2015).

In a complex system, it is argued that cyclic repetitions of problem definition, data collection and experimentation are essential since these processes themselves can change thinking and actions (Berger & Johnston, 2015, p. 53). In predictable and simple parts of our life, it is possible to consider data from the past and use that data to predict the future. Complexity theorists (e.g. Berger & Johnston, 2015; Davis & Sumara, 2005) suggest that predictions about the future cannot be based on happenings of the past. "Safe-to-fail" experiments may be needed which enable the observer to ascertain the direction in which the system is likely to move, rather than aiming to put in place solutions to create an ideal future (Berger & Johnston,

2015). Safe-to-fail experiments require a series of parallel, and maybe contradicting, trials from which data can be gathered. They are short term experiments which are transparent regarding what the new thing being trialled actually consists of and they may work around the edges of a problem rather than trying to tackle the central points of a problem. If we are to transform the education system for the 21st century, then teachers, school leaders and administrators need different roles and different ways of working and considering problems (Berger, 2007). Safe-to-fail experiments may offer that alternative way of considering a problem providing the context is in a "safe-to-learn environment", which is an environment where perfection and certainty are not expectations (Berger & Johnston, 2015). People in safe-to-learn environments do not need to work towards a unified vision of the future, they can develop their own views and vision.

2.6.2   The development of new ways of thinking for teachers to be supported to work in a Complex Space

If new forms of PLD are to be expected within schools, there is a need to consider how this would affect teachers since any shift in practice for a professional body is thought to be destabilising (Timperley, Wilson, Barrar & Fung, 2007). Changes in practice may be seen as a threat to their professionalism by some teachers. Postmodernity has brought with it new challenges and educationalists (e.g. Facer, 2011; Gilbert, 2005; Hargreaves, 2003) argue that there is a need to consider new ways of thinking and working. Berger and Johnston (2015) argue that happenings within schools are influenced by a wide variety of forces. Therefore, the experiences of one student or teacher could be very different to those of another student or teacher even in the same classroom on the same day. Although best practice is advocated, they suggest that it is by no means certain that replication of best practice guarantees a particular outcome. Many forces of interaction occur to enable something to happen and for that reason, it is only really possible to conclude the cause after the effect. Consequently, schools are described by Berger and Johnston (2015) as complex systems and, as such, educators need to consider what is possible as opposed to what is likely to happen. New "habits of mind" are required which necessitate educators to ask different questions, take multiple perspectives and see systems (Berger & Johnston, 2015).

Costa and Kallick (2009) identify sixteen habits of mind which are defined as the dispositions that are employed by successful people when they encounter problems. Of importance is the way people behave when they are faced with an array of challenges and questions, the answers to which are not immediately obvious. They argue that drawing on these sixteen habits of mind enables people to produce more powerful, quality results than they would without them. Whilst habits of mind are seldom used in isolation, the habits of mind 'creating, imagining, innovating' and 'thinking flexibly' would probably be required by teachers as we move forward. Additionally, within complex systems, whilst feedback is important, challenging questions do still need to be asked in order to shape that feedback (Berger & Johnston, 2015, p. 69). Costa and Kallick (2009) recognise that successful people ask the challenging questions which fill the gaps

about what is unknown. They identify 'questioning and posing problems' as a habit of mind which is apparent in effective problem solvers. Costa and Kallick identify the types of questions which a person displaying this habit of mind might pose. These include questions considering a different point of view, questions regarding causal connections and hypothetical questions.

Additionally, Kegan, Lahey and Miller (2016) discuss the philosophy that many organisations only focus on the development and growth of a small number of high profile individuals rather than having a culture and expectation that every member is encouraged to overcome their internal barriers to change. The authors argue that this focus on a small number of individuals for growth, leadership and development takes the simplistic view that these individuals will bring others along to do a good job and essentially ignores the complex nature of the education system. Conversely, the culture of support and development of every individual's growth which is woven into the ethos of an organisation produces what Kegan, Lahey and Miller (2016) termed a "deliberately developmental organisation" (DDO). According to the authors, a DDO encourages members to present their weaknesses and to use them as a talking point and opportunity for further growth and development and has the complex nature of a system as its driver. Where members of an organisation are given the prospect to consider where they are at present and compare that with where they could be, what the gaps are and how changes and growth could lead to betterment of themselves and the organisation, this is where spiralling improvements which actually make a difference could happen.

Complexity thinking is still in its early stages and currently developing and changing (Davis & Sumara, 2008). Phenomena have been under recent investigation by researchers who align themselves with emergent schools of thought such as:

- How do social collectives' capabilities outweigh the sum of the capacities of the individuals within them? (Bloom, 2001)
- What is knowledge? (Plotkin, 1994)
- What is education for? (Claxton, 2008)

In contrast with constructivist epistemology, these "transphenomena" (Davis & Sumara, 2008) require a concurrent examination of the phenomena *together with* the conditions of their emergence. Complexity theory gives us an alternative to the traditional lenses of educational research, one in which there is a membership in the development of insights as opposed to the application of principles.

2.7   Summary

The proliferation of future-focused education literature which has emerged over the last decade is taken as the overarching focus for this project. The scope and timeframe of this project did not allow for a full consideration of all of the themes emerging in the future-focused education literature. Therefore, one narrow aspect of this literature was considered; the changing view of

what knowledge means for learning in a knowledge society. The future-focused education literature calls for transformational change not only in what happens in schools but also in the way teachers think. This project takes into consideration teachers' changing views of knowledge. As a teacher myself, I recognise that this kind of transformational change cannot occur simply by telling teachers to think about knowledge differently; interventions are needed and new forms of interventions need to be trialled and studied if we are to be confident that they will bring about the changes needed. This idea is a thread through the future-focused education literature. The success, or otherwise, of the intervention under study in this project would, at best, be a measure of the participants' ability to expand their thinking about knowledge and change their possibly deep-seated views on what we mean by knowledge.

If, as the future-focused education literature suggests we need to, we are expecting teachers to actually shift their thinking, then they must be given PLD opportunities which enable them to develop new ways of thinking. Therefore, the current literature on teacher PLD was considered. Transformational learning of teachers, which is advocated in the future-focused education literature, is, however, unlikely to be achieved by the use of currently used PLD practices which usually involve sharing of ideas and best practice methods. Best practice PLD assumes that teachers are working in the complicated space and this, according to the literature concerning complexity thinking, is unlikely to create the types of transformational change required. Consequently, it was felt necessary to interweave the teacher PLD literature with the current research on complexity thinking when considering the research questions for this project. The problem here is not simply that teachers will need to be taught something new, rather it is that teachers will need to actually make changes to what they believe is true, putting aside the assumptions they have made due to past experiences.

Since much of the literature which focuses on teacher PLD in the 21st century advocates for teachers working together, collaborating and learning from each other, it was decided that a focus on interactions between teachers was an important consideration. Some future-focused educationalists (e.g. Drago-Severson, 2004) have suggested that the only way for teachers and schools to be effective in the 21st century is through the provision of effective, collaborative environments.

Whilst the think tank, which was the focus for this study, was designed to facilitate discussion within the group meetings, there were no specific requirements for members to interact outside of those meetings. I wanted to discover whether the provision of the think tank did actually encourage more interactions both within and outside of the meetings since, if it did, this could help to create the collaborative culture advocated for in the literature. The actual nature of any interactions was also seen as important since a true collaborative culture is thought by some to require engagement at a deep level where uncertainty can be debated. Therefore, in this project, the first research question became:

What is the nature and extent of a group of teachers' interactions as they participate in a think tank to foster collegial professional debate?

This question, in effect, is considering whether the intervention of the think tank itself created the conditions to encourage interactions between members. If there were more interactions and these interactions were at a deep level, this would suggest that the think tank had created the opportunities needed to start to shape a collaborative environment. The question draws on the literature considering teacher PLD. Since interactions and their nature can be influenced by a large number of factors including the past experiences of the people involved, it was important also to consider the complexity thinking literature as a lens to view the data when investigating this research question.

The consideration of 'transformational learning' is not straightforward and needs careful thought. It is hard to know what sort of data would be generated, if any at all, regarding this aspect of the study since there is a lack of existing empirical data with this focus. There is a possibility of identifying an apparent transformation in a participant's learning which is actually a short term idea gained from a conversation or piece of research. Therefore, it was felt important to concentrate in one area and keep the focus on that one area. In an effort to address whether the members of the think tank did undergo shifts in their thinking, it was decided to focus on one aspect which is given high importance in the future-focused education literature – the concept of what we mean by 'knowledge' in the 21st century. The second research question became:

To what extent do these interactions impact on the teachers views of knowledge and education?

This question considers whether the interactions could lead to transformational learning for the teachers involved in the think tank. The body of research that considers adult cognitive development was considered and drawn upon in an attempt to ascertain the extent of the impact of the intervention trialled in this project. Further work would be needed in order to discover whether any changes in thinking were enduring and this would give a better picture of true 'transformational learning'. This project is merely the start in answering that question.

The reasoning behind my perceived need for the study itself draws upon the calls for change in the increasing body of literature on future-focused education. The following chapter details the research design, methods and methodology adopted in this project in an effort to address the research questions.

Chapter Three: Research Design, Methods and Methodology

3.1 Introduction

This chapter provides a summary and a justification of the methodology and approaches used in this project. The focus of this research project is a group of teachers in one school who have formed a think tank to work collaboratively over time in order to develop some key principles that could underpin a future-focused professional learning programme tailored for their school. The think tank's espoused purpose was to develop these principles, seen as being vital for the study school's aspiration to 'continue to be at the forefront of innovative teaching and learning practice in New Zealand', which was a goal developed by the organisers of the think tank in the study school.

The leaders of this initiative acknowledge that this kind of collaborative development work requires 'strong' collegial interaction (talking, reading, arguing and debating) that eventually leads to new knowledge-building together, (Hargreaves & Fullan, 2012), and so the think tank was set up to support this. The members of the think tank were encouraged to discuss and debate issues regarding future-focused education. Readings were provided by an external expert facilitator and each member of the think tank was expected to engage in the readings and to be ready to discuss them at the following meeting. There was no rigidly set agenda for each meeting as discussions between participants could easily take the focus of the meeting in a different direction and it was considered important that this was allowed to happen.

There are two parts to this research project; the intervention itself, the think tank, and the research on two small aspects of it: whether it produced interactions between participants, and whether these interactions changed the participants' views of knowledge and education. These two parts are described separately below.

3.1.1 The intervention and its design

The think tank group was made up of eight volunteers from different areas of the school who knew each other, but did not usually work together. I was a member of the think tank group along with being the researcher for this project. Whilst voluntary membership was thought by the organisers to be an essential component, it was expected that each member attend every meeting and also that each member was prepared to engage in the reading material and debates. Reading material, which was shared electronically, was selected by the external facilitator and the body of literature on future-focused education was the main emphasis. There was also a focus on what is written about learning and how adults learn.

The group met for regular seminars six times between May and December 2016. The scheduled seminars were facilitated by the external educational professional, but members organised their own between-meeting discussions (face-to-face and online). The aim was that the seminars

would provide time and space for members to consider, digest and debate thought-provoking ideas in relation to teaching and learning for the study school's community - students, parents and staff. There was no set rigid agenda for each meeting. Rather participants of the think tank were encouraged to share their views which provided the structure for the meetings. There were, however, overarching themes for each meeting which emerged from the study school's motto which was 'Future Ready'. The external educational professional encouraged members of the think tank to consider this motto and, in particular, to reflect on what implications that statement had for the study school. As part of this, think tank members were asked to consider:

- what we mean by knowledge and learning and how these have changed and will continue to change
- how we know if learning has taken place
- the purpose of schooling in the 21st century
- the role of the teacher in a 21st century school

There were also discussions focused on complexity theory and adult cognitive development.

The think tank group was set up before the research project outlined in this thesis was proposed, and it took place independently of the proposed research. The research project was a post hoc addition. While it is possible that the research may have supported the group's general aims, it was not essential to them.

The theory behind the think tank was that if teachers were given time to interact with each other and to consider current research, they could use this together to develop a more in-depth understanding of the education system. This understanding could be achieved by the provision of time and space for members to consider, digest and debate thought-provoking ideas in relation to teaching and learning for the school's community. Therefore, the whole purpose of the think tank was dependant on the belief that individuals working within the think tank would seek further understanding and would develop their own meanings. The goal of the think tank, developed by the think tank creators at the study school, was, as they put it, to "develop transformational forms of teacher PLD that can allow the school to continue its tradition of being at the forefront of innovative teaching and learning practice in New Zealand…and to ensure that learning undertaken by staff is sound, future-focused and appropriate to the school context".[2] There were three strategies recommended for the think tank by its developers. These are outlined below.[3]

Strategy One

To develop a think tank of people whose purpose would be to work collaboratively over time to develop key principles that underpin the implementation of a future-focused and highly relevant professional learning programme. This discussion would be led by a tertiary partner. The think

---

[2,3]   This material was derived from a document which was developed collectively by those involved in setting up the think tank.

tank would take the form of regular seminars (two hours per month over a six month period). These seminars would provide time and space for members to consider, digest and debate thought-provoking ideas in relation to teaching and learning for the school's community; students, parents and staff.

Strategy Two

To develop a programme designed to provide this kind of support for individual teachers or groups.

Strategy Three

Later, when Strategies One and Two are well under way, the school could consider developing a plan for working with its parent community on the issue of what being "Future Ready" really means.

The purpose of the external educational professional (tertiary partner) in the think tank was not to provide information but to facilitate so that members of the think tank could construct their own understandings.

3.1.2 The Research Project

The research project's aims are different from those of the wider think tank project, and the research project was in no way intended to evaluate the think tank's processes or outcomes. Rather, the research took place alongside the think tank initiative which had already started before the research project began. The research project was designed to uncover the number and type of interactions think tank members engaged in, and then to identify any changes in the participants' views on knowledge and education, that might have resulted from these interactions. Through interview, I was able to study the number, type and quality of the interactions that took place between group members as they participated in the think tank and to gain insight into any changes in the teachers' views on knowledge and education.

The project considers the experiences of individuals as they participated in the think tank. Since their experiences were not accessible to the researcher via observations, interviews were required. The interviews involved questions designed to explore participants' views of, and reflections on, their experiences. An advantage of using an interview technique in this study was that I was able to control the line of questioning and was, therefore, able to focus it on knowledge and education.

To study participants' interactions in detail would have required a fine-grained ethnographic approach which is beyond the scope of this project. For this reason, I narrowed the project's focus to an investigation of the extent - and depth - to which participants discussed knowledge (its nature, its relationship with education, and their changing views of it) in the interactions they had as part of the think tank. The research was designed to address the following questions:

- What is the nature and extent of a group of teachers' interactions as they participate in a think tank set up to foster collegial professional debate?
- To what extent do these interactions impact on the teachers' views of knowledge and education?

The group of teachers refers to the eight volunteers who became members of the think tank. Since I was one of the volunteers, the 'group of teachers' under study were the remaining seven volunteer members of the think tank.

For the purposes of this project, interactions between members of the think tank were not orchestrated or deliberately constructed and so the network of interactions was unknown at the start of the project.

As the researcher, I was interested in co-constructed understandings of knowledge and how that relates to education. Therefore, I looked at the nature and extent of participants' interactions and then whether the views of the participants had seemed to change during the course of the meetings of the think tank. This was achieved by comparing responses to the interview questions at two different points during the series of think tank meetings.

3.2 Research Design

My general hypothesis in designing this research was that new forms of teacher PLD, which enable interactions and collaboration, can support teachers in developing more future-focused views on knowledge and education.

Opfer and Pedder, (2011) suggest that in order to gain a complete understanding of the workings of teacher professional learning, it it necessary to adopt practices which focus on the interactions between subsystems. These subsystems are the teacher, the school and the learning activity. Opfer and Pedder suggest that some studies conflict due to the methodological inclination towards process-product design. They discuss a shift from a cause-and-effect approach towards a focus on causal explanation in order to gain an understanding of the condiditons necessary for teacher learning. This project considers the interactions between subsytems by identifying communications between a group of teachers as a result of the learning activities they worked on in the think tank. The think tank consisted of a small group of teachers from the study school. The focus for the project was on whether or not activities that encourage more interactions can produce changes in teachers' learning. The activities in this case were happenings within the think tank and teachers' learning was their changing views on knowledge. Due to the scope and time frame of the project, it was not possible to track all of the interactions between particiapnts which may have resulted in a change in their beliefs. Therefore, the project was not a consideration of the possible extent of teacher learning but rather whether interactions brought about by a think tank model could influence teacher learning to some degree.

Crotty (1998) identifies a hierarchy of research design process elements as: epistemology, theoretical perspective, methodology and methods. In the following sections, I use Crotty's schema (shown below in figure 1) to outline the research design for this project.
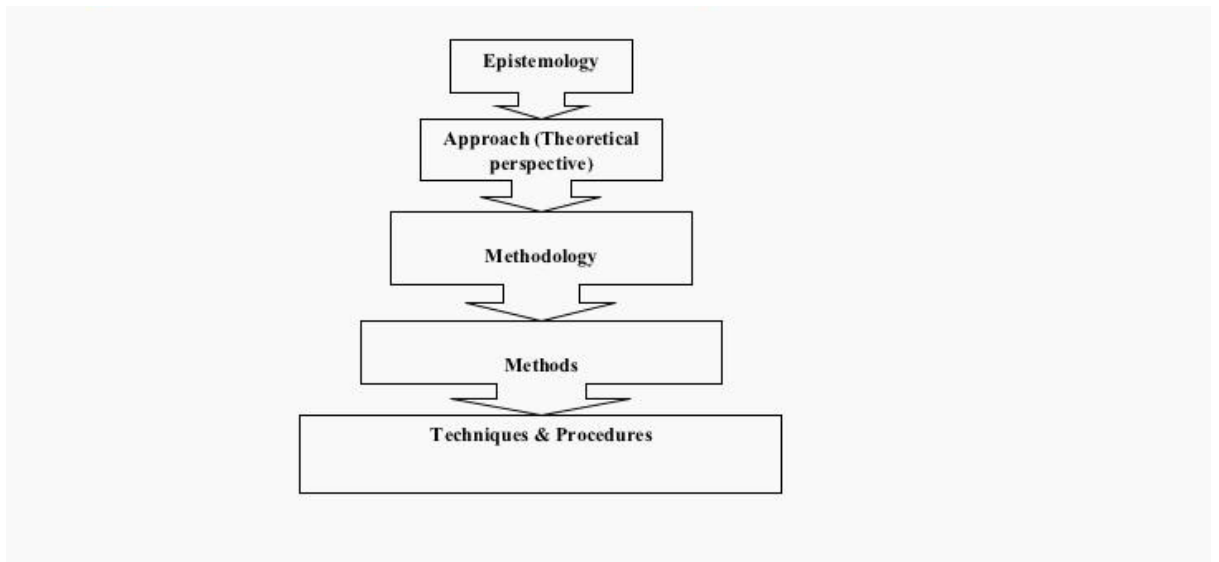
Figure 1: Crotty's Theoretical Grounding (Adapted)

Source: Crotty, M. (2003, p. 4). The foundations of social research: Meaning and perspective in the research process. Sage, London.

3.2.1   Theoretical Perspective

Due to the complex nature of the case, the phenomena under study in this project cannot be broken down into discrete parts but rather must be viewed holistically in terms of the interactions between the parts. According to Hetherington (2013), taking a complexity thinking approach to a case study can enable the researcher to uphold sensitivity to the emergent within a case. I chose to take this kind of complexity-influenced approach to study the interactions between the participants in this project.

Complexity thinking provides an alternative to the traditional lenses of educational research and also acknowledges the open-ended nature of complex systems. Additionally, complexity thinking requires the researcher to remain open to unanticipated events which may emerge during the course of the study. Recent work (Cohen, Manion & Morrison, 2018) suggests that complexity thinking may offer an alternative developing model in educational research since it challenges traditional approaches and may, therefore, uncover findings not previously considered. Additonally, Opfer and Pedder (2011) suggest that much of the current professional learning literature leads to misconceptions since it does not consider the interaction between important subsystems of professional learning. They maintain that, in order to uncover a causal explanation of teacher professional learning, it must be considered as a complex system rather than as a siloed, one off event.

One model of considering complex systems is the Cynefin framework developed by Snowden and Boone (2007) and shown diagrammatically in figure 2.
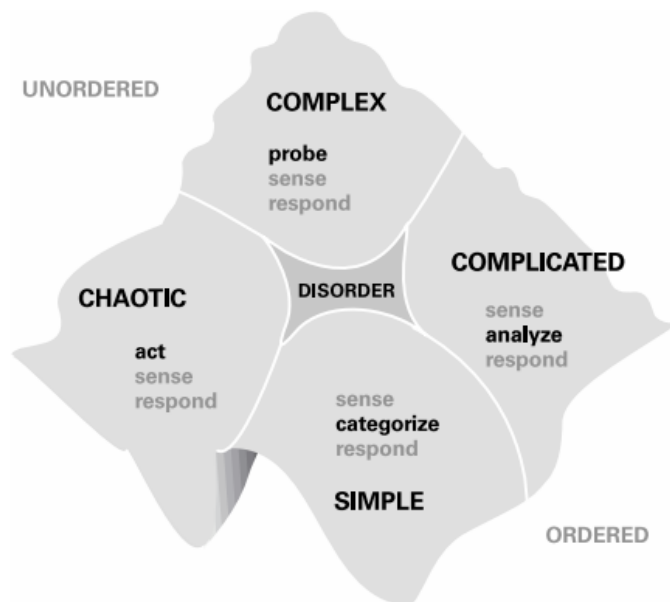
Figure 2: The Cynefin Framework

Source: Snowden, D.J. & Boone, M.E., (2007, p. 4). A leader's ramework for decision making. In Harvard Business Review, pp. 69-76

The Cynefin framework was developed to assist policy-makers in making decisions. It encourages people to consider how they perceive a problem by contemplating types of domain for working. In this model there are two domains: the ordered and the unordered. This research project was working in the unordered domain where, according to Snowden and Boone, there is no reliable connection between cause and effect. In this case, it is not possible to assume good practice will bring about predictable, wanted results. Research tells us that often people feel most comfortable working within the ordered domain and the complicated part of the Cynefin framework (Berger & Johnston, 2015). In this space people can make changes to practice which, if repeated, will bring about predictable results. When we embrace the complexity of a system we are able to put aside the need for certainty; diversity in thinking becomes necessary and listening to opposing views is essential (Berger & Johnston, 2015). In the complex space, cause and effect are only obvious in hindsight and the decision model in a complex space is probe-sense-respond (Snowden & Boone, 2007). This project considers the impact of interactions between people. There are a large number of factors which could influence how interactions influence an individual. The impact of interactions would be very difficult to predict without the probe-sense-respond model and a consideration of the complexity of the case.

Of importance to this project is the belief that a system does not become less complex if analysed on a smaller scale (Berger, 2016); the think tank in this study was a small group of teachers taken from the complex system of a whole school. Complexity theory helps us to gain an understanding of what is possible by the study of complex systems which may involve smaller scale experiments. The smaller scale studies are assumed to maintain the complexity of the whole system and this was assumed to be the case with the think tank. The think tank was assumed to pilot what could occur within a whole school system. This assumption is based on

the work of Snowden and Boone (2007) who maintain that emergent behaviours in a system can be investigated by the use of "safe-to-fail probes". The investigation of the effects of a safe-to-fail probe enables a stimulus to then be amplified if the response is desirable. These belilefs are the basis of the recommendations concluding this project.

Additionally, the think tank and the larger system it represents was an "open" system; that is, it could transfer energy and was capable of adapting to change (Snowden & Boone, 2007). The think tank comprised a number of diverse elements including participant's previous experiences, perceptions and ideas. This meant that unpredictable patterns were likely to emerge. This project aims to uncover emerging patterns of changes in perceptions of knowledge which result from participant's interactions *within* the model of a complex system. A study of the participants' interactions is then linked to how those interactions influence the participants' views of knowledge and education. It was beyond the scope of this small scale project to genuinely study the whole of the system in all of its complexity and including all of the fluctuations and changing patterns. Therefore, this study considers the individual entities within the complex system. The individual entities are the participants of the think tank. The project is a case study of these individuals' views of knowledge and education as they participate in a think tank. The case study is informed by complexity thinking since outcmes of the interactions under investigation are unlikely to be predictable and repeatable. Consequently, any suggested changes outlined in this project would need to be fostered, rather than driven and prescribed, and this is taken into account throughout the study.

3.2.2   Methodology

The methodology adopted for this study is that of phenomenological research. Phenomenology can be defined as: "the study of the structures of conscious experience as they manifest in people's mind" (Pernecky, 2016, p. 93) and is attributed to the work of Edmund Husserl who was one of the first to take a philosophical approach to the study of experience. Phenomenology is grounded in experience and located in the mind of the participant; it is a study of how structures appear in consciousness and, therefore, relates to the first person's point of view. Intentionality is also of importance in considering phenomenological research; that is the way an experience is directed towards a certain object. Whilst these aspects may appear to be in contrast to the consideration of complexity theory as the theoretical perspective, complexity is relevant to the interactions between people and how they occur whereas phenomenology is relevant to the shift in consciousness as a consequence of the interactions. The shift in consciousness in this study relates to the study of the participants' views of knowledge and education which may result from their interactions as a consequence of being a member of the think tank. Complex systems thinking acknowledges that every situation is a unique combination of people and circumstances and, consequently, generalisations of outcomes are not possible. Therefore, without a consideration of complexity thinking, any shift in consciousness could be thought to bring about an almost certain outcome in any situation. Opfer and Pedder, (2011) note that social interactions between different individuals combine in many different ways and, consequently, even very simple interventions can bring about an array

of causal pathways. An underplaying of the complexity of the problem could lead to a cause-and-effect conclusion which may be misleading. Opfer and Pedder, (2011) suggest that this type of cause-and-effect type of study has recently led to misconceptions regarding teacher professional learning and development. Therefore, complexity thinking in this project frames the research problem and the choice of methodology. Complexity thinking bounded the way I thought about the research problem but I have used phenomenology to structure the research methods. Consequently, the project became a *complexity-informed* case study.

Phenomenological research design involves the researcher describing the lived experiences of participants about a phenomenon (Creswell, 2014). In this project, the phenomena experienced relate to the increased number of interactions a participant may experience as a result of being a member of the think tank, and the resultant interactions arising from participants taking part in the think tank are considered. Specifically, the language used when participants describe their views of knowledge and how this relates to education are of importance in the analysis, together with how their descriptions change between the first and the second interviews.

3.2.3   Methods

This investigation is a narrow case study of the change in a group of teachers' views on knowledge as they participate in a collaborative think tank. Taking one definition, a case study is an inquiry in which a researcher develops an in-depth analysis of, in this instance, a group of individuals (Creswell, 2014). Case studies are bounded by time and activity and the researcher would usually collect detailed information about the issue under study. Developmental factors relating to the environment are often the driver. The information collection methods vary in a case study and usually a number of methods of data collection are used for each individual study. Additionally, a case study involves data collection over a sustained period of time (Creswell, 2014).

Whilst a case study method is appropriate for this research project, a full case study into such an unexplored issue was not possible in the time frame of the research. Therefore, a number of aspects were constrained in the study design to allow the study to be completed within the timeframe given. For example, the predominant data collection method for this study was face-to-face interview (although further questions were asked by survey) so it could not be claimed that there were varied collection methods. Furthermore, the timeframe for the actual data collection was an eight month period between May and December 2016. Whether this is a 'sustained' period of time is open to debate.

Taking another view, a case study method relates to the choice of what is to be studied rather than the methodological stance (Denzin & Lincoln, 2000, p. 301). Since, in this instance, there is a definite demarcation of boundaries which limits and restricts the study, the investigation can be seen to be a consideration of a 'case'. This demarcation of boundaries is seen by Denzin and Lincoln to be the main aspect which identifies a project as a case study. Additionally, Denzin and Lincoln define a case study as one which is in-depth and detailed, evolves over time and is studied in context. This study has some of those aspects:

Demarcation of Boundaries

Binding the case around teachers' views on knowledge and education enabled the placing of boundaries around the case study which were linked to the focus of exploration (that is teachers' transformational learning). The identification of actual transformational learning was not possible in the timeframe of the study; more the project was looking for instances of changes of the teachers' view on knowledge and education, which may or may not have been enduring.

The study focuses on interview responses from a small group of teachers which is a subset of the teaching staff in a large school and this can be seen as one simple aspect to the boundary. The teachers involved in this study were a part of a think tank which could also be viewed as a boundary. The think tank itself is more appropriately seen as the context for the study. Whilst there is controversy around the data that such a group can provide, Denzin and Lincoln (2000) argue that this type of group can certainly provide information about a broader picture.

There is also an issue with defining a bound case when considering a project through a lens of complexity thinking; the demarcation of a case relates to complexity reduction. Complexity reduction as discussed by Hetherington (2013) is an important concept in educational case study. Whilst complexity reduction may, in some cases, involve actively reducing opportunities for interaction, this would work against the research questions being considered in this project. Complexity reduction for this project was achieved by decreasing the number of elements within the system. The use of a small group (n=7) of teachers involved in the study led to complexity reduction and enabled the researcher to fully address the research question for each individual member in the relatively short timeframe of the study. There were, however, opportunities for multiple connections and interactions which would be seen in a complex system. Indeed, the study was an investigation into those interactions. Additionally, complexity reduction was partly achieved by focusing on participants' changing views on one aspect of future focused education: knowledge.

Depth and Detail

Hetherington (2013, p. 75) notes that there is a general consensus that case study emphasises "study-in-depth". For this project, the interview questions were deliberately written to allow participants to talk in depth about their thinking as their involvement in the think tank progressed. The interviews themselves were, however, conducted during the course of the teacher's working day and this did lead to a feeling of time constraint.

The interview questions were, however, designed to encourage the participants to think about their experiences and elaborate on them. In this way, depth was added to the investigation. Additionally, each interview transcript was analysed in detail in order to uncover any shift in views of the participants as the study developed. The case study enabled the use of a mixed methods approach to analysis which led to a "thick description" of data (Hetherington, 2013, p. 75). "Thick description" refers to the comprehensive account of experiences within the case under study.

Evolution over Time

The case study was investigated over an eight month period between May and December 2016. Interviews were conducted at two points: (1) early in the project (May 2016) and (2) when the current phase of the think tank project came to an end (December 2016). Data was collected on the number, type and quality of the interactions participants had with others about ideas raised in think tank discussions. These other people could be: (1) other members of the think tank group; (2) other work colleagues; or (3) others outside their workplace, for example, friends or family. Whilst the suggestion of a "sustained period of time" for a case study is rather subjective, eight months is on the shorter end of the time frame over which a case study would usually run.

Context

The context of this study was the think tank itself, which was set up to develop strong collegial debate between teachers. This contextual, as opposed to general, approach is also seen as an important factor when viewing a case through a lens of complexity theory (Hetherington, 2013). Since each complex system is exclusive, any knowledge of that system must be contextual.

An advantage of a case study approach for this project, therefore, is the ability to study the complexity of the phenomenon in a particular context (Simons, 2009). Since the theoretical perspective is that of complexity theory, it is important to keep in mind the complexity of the case. Since each complex system is unique, knowledge gained from research about that system must be contextual. Therefore, in many ways a case study approach befits the study. Complex problems are often approached in a linear manner (Berger & Johnston, 2015) and, consequently, findings become fixed and quickly do not relate to the current system. Complex systems involve non-linear, multiple interactions and so a narrative approach to analysis is often more appropriate than a comparative approach (Hetherington, 2013). The narrative approach allows for multidimensional thinking which enables identification of interacting elements of a complex space. The desire to predict the future, which is sometimes a driver of a case study, is not relevant in the complex space. Instead, it is important to focus on the non-linear findings and trust the process to self-organise providing emergence once time and space are provided. Whilst these aspects of complexity were taken into consideration for the study, the research questions address both the nature and extent of interactions between teachers as they participate in a think tank. Therefore, some comparative considerations were appropriate in the research along with a narrative approach.

Methods for this Study

Taking all of this into consideration, this investigation can be seen as a narrow, complexity informed case study of a small group of teachers (n=7) in one school. Its methods are mainly qualitative. There was a need to initially conduct quantitative research to quantify the number of interactions which had taken place. In this way, the first research question ('what is the nature and extent of a group of teachers' interactions as they participate in a think tank set up to foster collegial professional debate?') could begin to be addressed. The 'extent' aspect of this question was initially investigated by simply counting the number of interactions. The results of this phase were then built on by considering the responses of the participants qualitatively. The qualitative findings were used to address the 'nature' part of the first research question and then

to address the second research question ('to what extent do these interactions impact on teachers' views of knowledge and education'). The initial quantitative data was expanded on further with the qualitative data in a sequential manner.

A qualitative approach is useful when exploring the meaning individuals ascribe to a phenomenon and consequently, befits this study. Additionally, the data being sought is subjective and a result of experiences which would vary from person to person (Crotty, 2005); qualitative research projects attempt to understand multiple realities (Lincoln & Guba, 1985). Therefore, the methods, in particular the qualitative aspects, are in line with the theoretical perspective and the methodology of the project.

3.2.4 Role of the researcher

Initially, members of the (already established) think tank described earlier were asked whether they consented to take part in the study. I then used face-to-face interviews to collect data on:

- participants' views of knowledge
- the number, type and quality of the interactions participants had with others (observed in group meetings, and reported by participants from other contexts)

As a member of the think tank myself and additionally as the researcher, I was not a 'neutral' interviewer (Fontana & Frey, 2005). This aspect, however, led to me as the interviewer having an understanding of the workings of the think tank which allowed increased chances for discussion. It was important that I did not bring my own ideas and assumptions to the interview and I was conscious that I should not constrain the responses from the participants. The use of scripted questions helped to minimalize instances of adding my own assumptions and ideas. It was also important for me to consider the emergence of the study and to be responsive to the emerging case as it developed. Hetherington (2013) discusses the advantages of the researcher interacting with the case by being situated in the case itself. This scenario creates an opportunity for complexity reduction whilst still allowing for uncertainty and emergence, where complexity is both reduced and produced; produced by merging connections in alternative ways that have the likely effect of producing emergent phenomena. Whilst it was necessary to reduce complexity in order to carry out the research, this produced complexity in other areas. Moving the researcher from external observer to active participant enabled me, as the researcher, to interact with the complex case as it developed.

Fontana and Frey (2005) discuss the problems associated with interview technique in that each individual's interpretation of the language used may differ and they suggest that this could lead to confusion. With this in mind, face-to-face interviews with no definite time limit were conducted. It was felt that this would enable me to give clarity where there was ambiguity. The broad strategy in the interview technique was for the researcher to keep an open mind so that, as details emerged, seemingly insignificant data was not ignored. That is, detail was drawn out to enable the case to emerge and develop (Gillham, 2000).

The interview protocol outlined by Creswell (2014) was used. Creswell recommends note taking even when interviews are recorded and this advice was followed. The interview protocol included a heading (date, time and names), instructions for the interviewer to ensure standard processes, a list of questions, probes for questions and a final thank you. The interview questions were deliberately open-ended (see Appendix B) and there was a consideration that data would emerge inductively during interviews. Creswell (2014) suggests that open-ended questions allow participants to provide their own voice regarding their experiences and perspectives. Whilst interview questions were to be read from a script to enable consistency, there was also the possibility for additional questions and conversations to occur. In that way, the interviews were semi-structured. This flexibility was seen to be necessary in order to investigate the impact of the phenomenon of interactions resulting from the think tank.

Given the focus on complexity thinking, it was important that I could respond to the changing case as it emerged and so participants' answers were analysed in an ongoing fashion. This led to an additional set of questions being given to participants using a Google Form (see Appendix C). This Google Form was open to participants for two weeks after which six of the seven participants had responded. The questions in this form were designed to determine whether discussions and interactions held about the think tank topics would have taken place regardless of the type of PLD being offered. Participants were asked whether they would normally discuss in-school PLD learning with others and if so whether they thought the think tank sessions encouraged them to interact more often.

3.2.5 The Interviews

There were a total of sixteen scripted interview questions at the first face-to-face interview and twenty three scripted interview questions at the second face-to-face interview, with questions organised into two broad parts. The full interview schedule is included in Appendix B of this thesis. The first four questions were designed to uncover data about any conversations in which the participants had engaged as a result of their participation in the think tank. The questions asked who the participants had engaged in discussion with, how the discussions had started and whether there were discussions about knowledge which may have changed the participants' views on knowledge. The second part of the interview was designed to uncover the participants' views on knowledge and how the participants perceive knowledge and education are related. By comparing each of the participants' responses to this part of the interview, it would be possible to ascertain any changes in views on knowledge between the first and the second interview which the participants themselves may not have realised had occurred. There were eight questions which were asked in the second interview only. These eight questions were designed to uncover whether there had been a change in how the participants themselves felt their own views on knowledge and how it related to education had changed.

This data was self-reported, either collected in the interviews with participants by recording the interviews or collected from the Google Form survey responses. Each face-to-face interview

took around one hour, although some lasted longer than that where time allowed. Once the interviews had been recorded, I transcribed them verbatim. From there themes were uncovered. I decided to transcribe the interviews myself since, although it was very time-consuming, this gave me the opportunity to carefully consider the participants' responses. It was after transcribing the interviews that it became apparent there had been many interactions between participants. It was not clear, however, whether these were a direct result of the think tank or whether they would have normally happened after PLD had taken place. This led me to develop an additional set of questions attached in Appendix C.

3.3 Analysis

3.3.1   Counting Participants' Interactions

In order to make it possible to keep track of each participant whilst keeping their <u>actual</u> identity private, each participant was given a code (e.g. Participant 1, abbreviated P1 etc.) Following this, analysis of the data initially involved a consideration purely of the number of interactions which had taken place as a result of the think tank. This phase was designed to allow me to start to consider the first research question:

<u>What is the nature and extent of a group of teachers' interactions as they participate in a think tank set up to foster collegial professional debate?</u>

The aim was to initially consider just the *number* of interactions each participant had engaged in as a result of the think tank. This was achieved by taking the transcript for each participant and identifying where they had explicitly stated that they had engaged in interactions which had resulted from the think tank and then tabulating these (see example in figure 3).
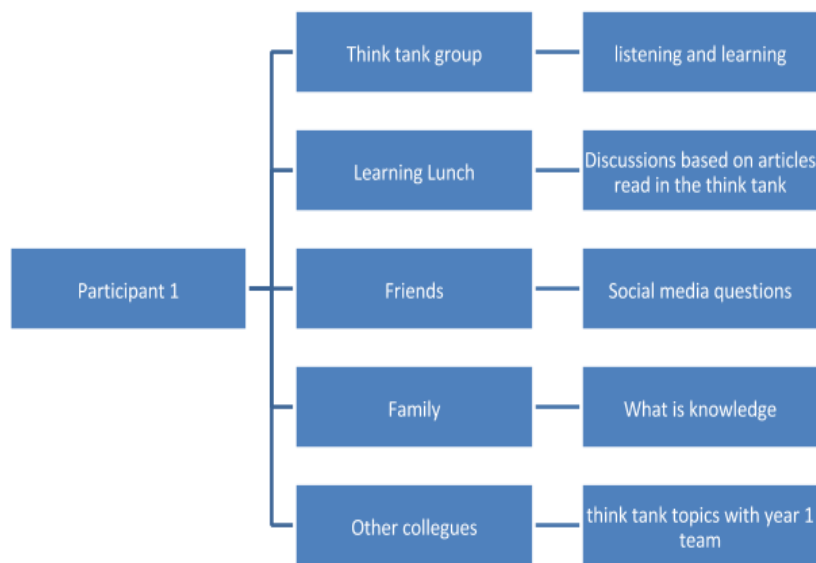

Figure 3: Number of Interactions of Participant 1 connected to the think tank intervention

The results were then recorded as a raw number for each participant.

3.3.2 Identifying the Nature and Extent of Interactions

Qualitative research is interpretive and therefore in analysing the data for this project, it was necessary for me to:

- consider participants' perceptions of the extent to which the interactions with their colleagues have added to their "social capital" as defined by Hargreaves and Fullan (2012) and discussed in Chapter Two of this thesis. That is how had participant's interactions increased their access to, and capacity to reflect on, knowledge;
- consider evidence of changes in participants' views of knowledge during the project;
- look for any evidence of changes in the way participants interacted as the project progressed.

These considerations relate to the second research question:

<u>To what extent do these interactions impact on the teachers' views on knowledge and education?</u>

Once this data regarding individual participants was collected, themes were uncovered regarding the *nature* of the interactions which had taken place. This was achieved by cross referencing the data obtained from each individual participant. A thematic approach is a common method for the analysis of qualitative data (e.g. Mutch, 2013). Initially, themes from individual participant's responses were identified which related to the research questions and these were highlighted in the transcribed interviews. Tesch's eight steps in the coding process were taken into consideration in the coding of the data (Tesch, 1995). These eight steps include;

- initially reading the whole of each transcript carefully to get a sense of the meaning
- for individual transcript documents, identify any underlying meaning
- from this make a list of all topics and find the most descriptive wording for topics and turn them into categories
- next make these categories the code and then assemble data according to each category in one place

The fact that I had transcribed the interviews myself helped with this part of the process as the themes were becoming apparent during the transcribing process. The codes which were used for identification were;

- a mention of knowledge
- a mention of how knowledge relates to education
- a mention of an interaction in which they had taken part
- a mention of a shift in the participant's own perspectives

Once four copies of each of the transcripts had been made, the four codes were highlighted in each of the separate interviews for each participant. At this point, each of the participants had eight transcripts (four from interview 1 and four from interview 2) with colour coded references to the above four codes. I then compared the responses between interviews 1 and 2 for each code for each individual participant to identify any changes in the participants' views which the participants had not explicitly recognised or mentioned as a change themselves. I did this by tabulating the results of this part of the analysis as shown for one of the participants in figure 4 below. Throughout this process, validity and credibility of the data were kept in mind.

Participant 3						
Discussions outlined at Interview 1			**Discussions outlined at Interview 2**			
	Person discussion was with	**Nature of the discussion**	**Extent of the discussion**	**Person Discussion was with**	**Nature of the discussion**	**Extent of the discussion**	
1	School principals	Discussion around what is knowledge	General, short	All staff	Chats at morning tea	General	1
2	Participant 2		Deep conversations	Researcher	Discussions regarding Masters thesis	Casual, short	2
3	Beginning Teacher	Views on knowledge	General	Participant 2	Discussions regarding PL	Deliberate, in depth	3
				Participant 6	Discussions regarding articles	Deliberate, in depth	4
				Facilitator		Deliberate	5
				Participant 4	General chat		6
				Participant 5	General chat		7
				Middle school leaders	Trans disciplinary	Questioning and challenging	8
				Son and daughter	What is knowledge		9

Figure 4: Comparison of the number, nature and extent of interactions between interview 1 and interview 2 for participant 3

3.4 Validity

Aspects of veracity rather than validity are usually the major concern for qualitative researchers.The methods of achieving veracity in the short time frame of this project have been discussed earlier in this chapter through the methods section. For example, keeping the focus on a narrow aspect, knowledge, and also keeping the number of participants low, enabled me to concentrate on any differences in thinking about knowledge with relative ease. I also made sure that the interview questions were not leading and I kept boundaries around time and activities. Additional to the considerations in methods and methodology, I deliberated on the coherence of literature and the rigour in interpreting the findings as important in establishing veracity. Whilst

veracity is an important consideration in qualitative research, the question of validitiy does also need to be addressed.

Lincoln and Guba (1985) suggest that four aspects of a study give a picture about the trustworthiness or validity of the study. These aspects are credibility, dependability, transferability and confirmability. In the complex domain, transferability may not always be relevant since, in this case, tried methods are known to not always produce the same outcomes. Part of the identification of a complex space is that there are very many factors to consider and, therefore, we are unable to ensure that any given practice will produce the desired results. The undertaking of a "thick description" (Hetherington, 2013) of the case was still seen as important in enabling an understanding of how the research progressed. That is, a comprehensive account of experiences within the case was worked towards.

Validity of findings is important in qualitative research to ensure that the reader is convinced that the findings are credible and can be trusted (Mutch, 2013). Lincoln and Guba (1985) suggest that credibility partly relies on the researcher being involved in the case for sufficient time in order to become orientated to the situation and to account for distortions. As a member of the think tank myself, my involvement in the case was sufficient to cover this consideration. Creswell, (2014) notes that mixed methods approaches may have additional validity requirements compared to other methods. For example, the accuracy of the findings may be compromised if the researcher does not consider all of the options for following up on the quantitative results. This is not the case for this project since the quantitative phase was simply a precursor and used to identify whether there were sufficient interactions to make the qualitative phase meaningful. The approach was not strictly a mixed methods approach since the quantitative phase did not require statistical rigour as suggested by Creswell, (2014) and was merely a counting of the number of different types of interaction.

Qualitative validity requires the researcher to check for accuracy in the findings (Creswell, 2014; Gibbs, 2007). This can be achieved via a number of methods some of which were appropriate for this study. Triangulation is seen as one of the most important strategies to enhance the credibility of qualitative research (Mathison, 1988). Additionally, triangulation concurs with the methodology of constructivism since constructivism considers the development of a deeper understanding and qualitative research aims to probe for deeper understanding rather than a consideration of surface features (e.g. Johnson, 1995). Furthermore, constructivist theory states that knowledge is developed and constructed through social interactions (Crotty, 2005). For this study, triangulation of the different sources of information was made feasible partly due to the small number of participants in the study. For example, where one participant felt that they had engaged in an in-depth interaction with another participant, it was possible to examine evidence for this from both sources with relative ease. Similar themes were uncovered where each of the participants discussed depth of interaction in deciding whether it was feasible to count an interaction as for example 'in-depth'. Thus, themes were established by converging several sources of perspectives which added validity to the study. Methods triangulation as discussed by Patton (1999) involves using both quantitative and qualitative data in the research. Methods

triangulation may be used in an attempt to reveal complementary aspects of the same phenomenon and was a consideration for this study.

The open-endedness of the questions in the interviews also added to the credibility of the data. When questions are open-ended the participants' responses are less likely to be constrained or affected by the views of the researcher or by the knowledge of previous research findings (Mutch, 2013). For example, the question: "who, if anyone, have you talked to about any of the ideas we have discussed in the think tank" is more open-ended than: "tell me which participants of the think tank you have discussed ideas with".

Member checking was also used to enhance validity. This was undertaken by summarising the interview with each participant at the end of the interview and covering the major themes (Creswell, 2014). Participants were asked whether they agreed with my perception of how the interview had progressed and any changes were noted and taken into consideration.

Transcription mistakes are possible which can impact on the validity of the data. As the researcher for this study, I transcribed the interviews myself in an attempt to capture the whole essence of the interview and to minimalize mistakes in transcription. Once interviews had been transcribed, thorough checks were carried out which involved listening to the recorded interviews whilst reading the transcriptions concurrently. Any mistakes made during transcription were corrected at this stage (Creswell, 2014). Whilst this process was very time-consuming, it gave me confidence that the transcripts did reflect the actual interviews accurately.

The small sample size was a concern when considering validity. There was little the researcher could change about this since the think tank had already been set up and the school had decided on the number of participants they would like to have in the think tank. Also, as mentioned above, it could be argued that the small sample size added to the validity of the study and it was certainly a factor in complexity reduction.

3.5   Ethical Considerations

Of importance in a research project is the need for a researcher to anticipate ethical considerations which may arise as a result of their studies (Punch, 2014). Whilst there was no deceit or coercion involved in this research and the risks to participants were no greater than those involved in their everyday work lives, there are a number of other ethical considerations.

The recruitment of the participants and the initial contact was facilitated by the fact that the think tank was already in progress and I was a member of the think tank. Since I was known and a colleague to the members of the think tank it was necessary to take extra measures to ensure no pressure was placed on prospective participants to take part (Creswell, 2014). To this aim, an independent third party was employed to email the members of the think tank requesting their participation in the project. The email addresses of participants could be found on the school website. The email (1) briefly outlined the purpose of the research (and how this differed

from the wider think tank project), and (2) invited them to participate in the research. The email also asked members who agreed to be a part of the project to sign a consent form.

Before the research project was in place, the participants were already committed, via their participation in the think tank, to working together with an aim to develop a school-wide, future-oriented teacher PLD programme. Participation in this research was likely to strengthen both this commitment and the professional relationships between those involved. In this way, the research design and practice encouraged a mutual respect and benefited participant autonomy and ownership. The consideration of an outcome which would benefit others besides the researcher was given importance (Punch, 20014). I had been careful to design a project that could contribute to the wider think tank project's long-term aims without adding too much extra complexity or work for the individuals involved. Participants were required to give up around three hours of their time to this research project (over and above the commitment they had already made to the think tank discussions). The three hours was taken over two interviews. If participants decided to check their interview transcripts, additional time was to be required.

The privacy of the participants was also an important consideration, especially bearing in mind the small sample size and the fact that the participants were known to the researcher (Creswell, 2014). Information obtained from individual participants was kept confidential but the aggregated findings were to be shared with the group. Participants had an opportunity to check their interview transcripts for accuracy, and I treated all individuals and their information professionally and respectfully. As the primary researcher and also colleague of the participants, I knew the identity of the participants. I kept the interview recordings and transcripts confidential, and in reporting the findings the participants' identities are kept confidential. No names or other potentially identifying information was used. Due to the small scale of the project and the size of the school, people who know the school and/or who know about the project will probably know who was involved in this research, but they will not be able to identify individuals or their contributions in the report on the findings since coding, discussed in the analysis section of this chapter, was used to de-identify the participants in the writing up of key findings.

The interviews were conducted in a way that was designed to put participants at ease (Creswell, 2014). Participants were told that there were no right or wrong answers to the questions, and I tried to ensure that the interviews were conducted in a calm and relaxed manner with refreshments available. Participants were given choice regarding timing and place of the interviews to ensure they felt comfortable in the situation and were not concerned about time constraints.

Whilst I had other roles within the wider think tank project that is the context for this research I had a clear sense of the boundaries of my respective roles. I was one of the members of the think tank group but I had no management or other direct report relationships with any of other group members. Whilst I did have a middle management position at the school, I worked in a different area of the school, and did not work directly with any of the participants in a

management role. Thus, it is unlikely that any information obtained through this project could, even unintentionally, be used in other contexts to advantage or disadvantage my colleagues.

Power imbalances are a consideration when conducting the qualitative research (Creswell, 2014) and some power differentials were inherent in this project. All of the think tank participants worked at the same school and had existing, wider collegial relationships. One was a member of the school's senior leadership team, and others had management responsibilities in the school. The group was aware of these issues, which were discussed when the think tank group was first set up, and again when the research project was mooted. The group had been deliberately set up to foster different, more collaborative ways of working, to experiment with working 'outside the square' of traditional practice, in diverse, cross-school groups. Therefore, the group made a commitment to working through any issues that may have arisen. Additionally, these issues apply more to the think tank project as a whole than to the research project described here.

The possible conflicts of interest and/or power imbalances outlined above are unavoidable in the context and design of this research. They were managed via the following strategies:

- Clear separation between the research aims and the aims of the wider think tank project;
- A research design involving interviews with participants on issues that are not central to the wider project's purpose;
- Keeping all individual information shared for the purposes of this research, e.g. in the interviews, strictly confidential to the researchers. This information has been stored in locations external to, and not under the control of, the school.

In considering the privacy of the participants, aggregated findings from the research project were to be shared with participants as they emerged and at the end of the project, but individual information was not shared (Creswell, 2014). Individuals and any contributions they may make to the research data have not been identifiable in the report on the project's findings. With this in mind, the kinds of information to be collected (i.e. participants' view of knowledge and self-report data on the number and kind of conversations with others they have about ideas discussed in the group) are unlikely to be sensitive for participants in terms of their wider roles and/or performance in the school. Participants were not asked to give information on, or their views on, anyone else in the school; the interview questions were entirely focused on their individual thinking, experiences, and reflections.

3.6   Summary

This chapter has given an account of the methodology and approaches used in this study. Additionally, the researcher's epistemological stance of constructivism is outlined based on the belief that participants in the project are likely, through the think tank, to seek greater understanding of the world in which they live; in this case an understanding of how knowledge and education are related in the knowledge age. A constructivist view is that participants will use their greater understandings to develop subjective, and varied, meanings for their experiences, and the connection between this view and the project have been discussed.

This section also considers the theoretical perspective of complexity thinking and how this links to the methodology of phenomenological research for this project. The investigation is discussed as a complexity informed narrow case study. Ethical issues relating to the study are discussed, and issues relating to validity of the data are also considered.

The next chapter discusses the key findings provided by the research methodology and data collection methods.

Chapter Four: Results and Key Findings

4.1   Introduction

This chapter gives an account of the results and key findings of this project identified from the analysis process described in Chapter Three. These findings are used to address the two research questions.

The aim of this study was to investigate the nature and extent of a group of teachers' interactions and also the extent to which their interactions impacted on the teachers' views of knowledge and education as a result of their participation in a think tank. Hence, it was important not only to uncover the number of conversations which took place but additionally to ascertain whether these were conversations which would not have taken place without the think tank. Furthermore, it was necessary to identify the impact of these conversations in terms of shifts in the teachers' views of knowledge and education as opposed to the teachers merely taking on board what was discussed in the think tank sessions.

In considering the nature and extent of the teachers' interactions, the data suggests three main themes. Firstly, and most obviously from the data, many conversations took place as a direct result of the think tank. Secondly, the data shows that the types of interaction between teachers as a result of the think tank differed from other types of interaction usually engaged by these teachers. Thirdly, and probably most importantly, it was apparent that involvement in a think tank could set up the conditions which enable the beginning of a shift in thinking for teachers as a result of collaborative interactions with colleagues. This third theme is suggested by the participants' apparent shift in their views of knowledge - away from a thing which can be gathered, stored and added to, towards a view of it as a form of energy which makes other things happen, and as something which can be created.

4.2   The Nature and Extent of Interactions

The findings of this section relate to the research question: "what is the nature and extent of a group of teachers' interactions as they participate in a think tank set up to foster collegial professional debate".

It was found that all of the participants were keen to engage in the interview process and all were positive about the opportunity to be involved in the think tank, describing the process as "engaging", "motivating" and "invigorating". Although think tank meetings were held for two hours at the end of a busy school day, this did not discourage the participants, in fact two members discussed the feeling that time passed quickly and the desire to spend more time in the sessions. They all, at some point, discussed the challenge of the robust discussions arising from the think tank and all appreciated the opportunity to have their thinking challenged, with

one participant stating "in my eight years…I am finally being challenged". Many of the participants discussed the importance of the presence of an outside expert as this person "focused the debate" and was "a motivator" as well as having an understanding of and access to valid readings which would facilitate discussion.

When identifying the nature and extent of the teachers' interactions as they participated in the think tank, it was apparent from the data that numerous interactions did occur which would not have taken place without the think tank. These interactions were largely in the form of face-to-face conversations, with only one of the participants identifying other forms of interactions in the form of online discussions. Many conversations took place outside of the think tank meetings, directly as a result of the topics of conversations within the meetings, and these conversations increased in number over the course of the time that the think tank ran.

Six of the seven participants undertook two interviews each, with the seventh participant completing only one interview. The thirteen interviews identified 59 clusters of conversations arising specifically from the think tank. It was difficult to ascertain actual numbers of conversations since interviewees talked about speaking with family members or members of their faculty without saying specifically how many people they were referring to or how often they had engaged in conversations. Some of the conversations (13 of the 59) were identified as 'general", "brief", "casual" or "informal" whereas some (5 of the 59) were described as "formal" or "planned". The word "questioning" was used to describe 5 of the 59 conversations and 5 of the 59 conversations were described as "in depth" or "deep". 5 of the 59 conversations were described as "deliberate". Of the 59 conversations identified, 9 were specifically about knowledge and a further 15 were identified as relating to think tank topics, which may have included knowledge.

In aiming to ascertain whether the think tank sessions, as opposed to other types of PLD opportunities, had impacted on the nature and extent of teachers' interactions, the participants were asked whether they would normally discuss their learning from PLD with others. All of the participants acknowledged that they would normally discuss their learning with others when they attend PLD sessions. These conversations would usually be about "sharing" ideas or "telling" their colleagues about the PLD session. A difference between discussions which usually took place as a consequence of other PLD opportunities and the discussions resulting from the think tank was that the discussions which arose as a result of the think tank were centred around current educational research and that they were about education. They all said that the think tank sessions had encouraged them to have more discussions specifically about education than they normally would have. Some went on to say that those discussions were about the role of education and involved sharing current research and that these topics were not mentioned in relation to other PLD sessions. It was also noted that think tank topics encouraged others to be "open to new ideas" and to "look at different perspectives". Participants stated that conversations after the think tank sessions and about the think tank topics were directed at key people, e.g. the Principal, Heads of Faculty, other members of the school management team

and Board members. In comparison, participants' conversations around other types of PLD sessions were mainly casual conversations with colleagues in their departments or conversations with friends and family. Often, conversations about other types of PLD were "spontaneous" and directed at people who participants felt "may be interested". Conversely, conversations arising from think tank topics were deliberately directed towards stakeholders who had influence on the system or towards people who had intentionally enquired about think tank topics (for example, see the Friday Lunchtime Conversations group discussed below) and they were, therefore, "motivated to discuss learning and open to new ideas". Additionally, the conversations arising regarding the think tank topics involved sharing readings which had been suggested by the think tank facilitator.

It was possible to uncover numerous examples of interactions which had occurred as a result of the think tank sessions. How far the interactions reached and branched out was possibly not revealed in the findings of this study because of the way it was designed. The thinking about how each of the interactions may have led to other interactions in a kind of "domino effect" relates to the literature about complexity thinking. This is highlighted by the organisation of another group of teachers who were not all involved in the original think tank sessions. This second group was set up by one of the original members of the think tank and she called the group "Friday Lunchtime Learning Conversations". This group was set up part way through the time that the think tank was running. The organiser felt that the Friday Lunchtime Learning Conversation group would allow a "springboard" into other conversations. The organiser was not originally planning to use it to discuss think tank ideas, and the idea for the group did not emerge as a result of the think tank. At the request of the members of the group, these sessions came to be used as a forum for sharing think tank information and ideas. Those who attended these sessions were colleagues who chose to attend and so it was felt by the organiser that all were motivated to discuss learning. Two members of the original think tank group also attended the Friday Lunchtime Learning Conversations and there were around another 10 members of this group from different areas of the school. The organiser felt that discussions within this group were "deliberate and challenging thinking around what knowledge is and what learning is and what the future really looks like for our kids". It was felt that, without the think tank input, the focus of this group would not have been on questioning knowledge and learning, but rather on applying classroom practices.

4.3   Impact on the participants' views of Knowledge and Education

Here I consider apparent changes in the interviewee's views on knowledge and education. Many of the participants mentioned the usefulness of the think tank discussions in shaping their own thinking around knowledge with statements such as: ""it makes me think about what has informed my perspective and what informs their perspective" and "there has been a shared experience in a sense because we talk, and talk allows you to both reinforce ideas but also to open up new possibilities" and "it has definitely challenged my thinking, more often where I have

had time to process it and been able to explain my opinion or perspective or ask the questions that remain unanswered".

Three themes emerged in relation to the research question, "To what extent do these interactions impact on the teachers' views of knowledge and education?" These three themes were as follows:

- Participants changed their views on knowledge, some as a direct result of conversations they had
- Participants discussed the need for teachers to be future focused in the second interview but not the first
- Participants discussed a need for a transformation in education in the second interview

To ensure a change of views was being considered, sets of statements were identified from each participant, the first set from the first interview, before think tank sessions had taken place and the second statement set from the second interview, after the think tank sessions had concluded. Participants were numbered (1-7) and known as P1 to P7 for identification purposes and in order to align the pairs of statements. For ease, each participant is referred to where necessary as "they".

4.3.1   Participants changed their views on knowledge

There were a total of 37 instances of apparent changes of views on knowledge after the think tank sessions with five of the seven members of the think tank expressing a change in their views on knowledge. Of these changes, eight were explicitly identified as emerging directly from conversations; that is, it was explicitly stated that it was the conversations with others which had facilitated a shift in the participants' views on knowledge. The question of whether their view had changed as a result of a conversation arising from the think tank was not specifically asked in the interviews and so this number could be higher. The three main themes regarding shifting views of knowledge which emerged were:

I.   From the view that knowledge is something which is a constant and added to in a person to the view that knowledge is something which can be created
II.   From the view that knowledge is something people need in order to gain qualifications to the view that knowledge makes things happen
III. From the view that knowledge is a thing in itself to the view that knowledge is a kind of energy

Theme 1: From the view that knowledge is something which is a constant and added to in a person to the view that knowledge is something which can be created
Two people suggested that students need the capacity to create knowledge rather than adding to a knowledge bank. At the initial interview, both participants talked of knowledge being constant and the possibility of adding to knowledge within a person but then, in the second

interview they alluded to knowledge being something which is not fixed and can be created anew. In the initial interview P4 stated that: "it is important to have the motivation to gain knowledge", whereas in the second interview, when considering how knowledge and education are related, they had the view that "you have to have the capacity to build, to actually create your own knowledge", so knowledge as something created became important after the think tank sessions whereas it was not important to them before the think tank sessions. P4 also talked about new knowledge building on old knowledge in the first interview: "learning from the past and building on it is how knowledge of English develops. Most people know about Shakespeare and they can use what they know to build on their knowledge", but then talked about the creation of new knowledge in the second interview: "without the knowledge of numbers you are not going to be able to create new knowledge". Another participant, P2, discussed knowledge as something students "get" from "sources" in the first interview: "it is important that [students] get knowledge from reliable sources", but then went on to say that, in order for students to become more knowledgeable, students needed to "personally think for themselves in a different way" in the second interview. When asked whether the conversations arising out of the think tank had changed their views on knowledge, this participant stated: "Yeah…it is the interconnections, the capabilities to build on each other's knowledge through collaboration". This concept of building new knowledge had not been apparent in the first interview.

Theme 2: From the view that knowledge is something people need in order to gain qualifications to the view that knowledge makes things happen

In the initial interviews, all of the participants debated the idea that knowledge is something that people need to enable them to answer questions or to gain qualifications. Knowledge was seen as being "obtained by reading" and "factual" (P1), "memory based, can be recalled" (P2), "like a data base" (P3), "disciplinary knowledge" (P4), "knowledge about a subject" (P5), "at the core of education" (P6) and "information gathering" (P7). Four of the people interviewed expanded their view to believe that knowledge is needed not only to gain qualifications but also to make other things happen. Therefore, whilst these four participants did still discuss their feeling that students needed to know "things" in order to answer assessment questions, they were also beginning to identify another type of knowledge, the value of which being about what that knowledge can do in a particular context. The following paragraphs identify pairs of statements which suggest these four participants had started to shift their view of knowledge in this direction.

Participant P5 in the first interview described knowledge as "known, ordered pieces of data points that have undergone some shaping and, therefore, become useful. Knowledge in the disciplines is important", indicating that the usefulness was around having a subject knowledge. In the second interview, however, P5 discussed "knowledge that you need to have that allows you to do work" and that this is something they had now noticed and found interesting. They said that they now felt that there is a difference between "knowing something and then doing something with the knowledge". They also talked in the second interview about "knowledge

being something that makes things happen" and observed "that is a different way of looking at it" showing that they believed their perception had altered.

Participant P6, when discussing knowledge that students need, stated in the first interview: "this knowledge is so result based isn't it? You have to learn these things so that you can get your qualifications". Whereas in the second interview they said that students needed "to be able to use the knowledge they have got, in lots of different circumstances". They also felt that students should "think about what am I going to do with this knowledge" and "there is a difference between knowing something and doing something with the knowledge". Hence, there was a shift in this person's perception that knowledge is something to be learned, most importantly to gain qualifications, to the view that it was necessary for students to question what they are actually going to do with the knowledge and, therefore, the feeling that the value of knowledge is not based on the facts that a person has gathered but more on what can actually be done with that in a particular context.

Participant P2 talked extensively about what they believed knowledge to mean: "knowledge is a learnt set that is always changing of ideas, facts, concepts, ideologies, beliefs, values, they kind of are required to make decisions", "knowledge should be something kids could pursue, the stuff they have an interest in so they have enough knowledge after their 13 years at school", "there is knowledge in reading, being well read". In the second interview P2 only talked about knowledge being something useful "it has to be useful, to make sense of something…has to be something to inform something else". So, this person's perception of knowledge as a thing that students gather over their 13 years at school changed to the belief that the most important thing about knowledge was for it to be useful.

Participant P3 discussed knowledge as stuff in the first interview: "to know a lot of stuff" and "the same bag of knowledge" and then talked about relevance in the second interview: "it's how relevant that is" again moving away from the perception of knowledge as a thing needed to gain a qualification. P3 was moving towards the view that whilst knowledge in the traditional sense was still valid, knowledge as "stuff" was not the end point.

<u>Theme 3: From the view that knowledge is a thing in itself to the view that knowledge is a kind of energy</u>
Three of the people interviewed talked at the second interview about knowledge being something that can be shared, about interconnectedness, being received through your senses and, therefore, expanding within a person. For these same three participants, the idea started to emerge in the second interview that knowledge is changing to be something created in the spaces between people rather than in the individuals themselves. The following paragraphs identify pairs of statements which suggest the three participants started to change their views away from knowledge as a thing in itself towards knowledge as a kind of energy, something created in the spaces between groups of people.

Participant P4 stated in the first interview that "I think it is important that teachers of disciplines have a range of disciplinary knowledge" and also talked about "knowledge in terms of knowing

69

things". In the second interview, however, they moved away from this view as knowledge being something which is discrete and held within an individual and talked about "knowledge as being not the people in the room, it is the room itself, it is the interconnectedness, the capabilities to build on each other's knowledge through collaboration".

Participant P2 talked in the second interview about "knowledge is something shared" whereas in the first interview this had not been mentioned and knowledge by this person was thought of as something to be gained "motivation…. to gain knowledge".

Participant P5 made no mention of knowledge being received through an external process in the first interview and described knowledge as "truth and reality" but in the second interview said that knowledge was "received through some kind of process external to yourself".

Additional to the three themes discussed above, participants acknowledged that they knew their own perceptions of knowledge were changing, with four different participants when asked whether their own views on knowledge were changing, making statements such as:

- "I am interested in how teachers make that step change"
- "I am very interested in exploring that further"
- "I enjoy the discussion…and I don't know what will happen"
- "an interest in what kinds of knowledge our students will need in the future"

4.3.2   Participants discussed the need for teachers to be future focused

All participants discussed the importance of quality teachers in both interviews, before and after the think tank sessions. Therefore, there was the general belief before the think tank sessions that teachers' ways of working are key to ensuring quality education. In the second set of interviews, however, most participants made reference to the need for teachers to be future focused and to develop new skills which would enable future-focused education. There were no references in the first set of interviews to suggest participants felt teachers needed to develop future-focused thinking skills. In identifying changes to teachers' views on *education* after the think tank sessions, statements emerged regarding teachers and the requirement for teachers to be future focused in the second interview which were not apparent at the start of the sessions. The following considers examples of this.

P4, when considering the link between knowledge and education, discussed the skills of the teacher at both interviews. In the first interview P4 discussed the necessity for teachers to "learn about other cultures" and to "know things to help us to be able to do other things". The main theme of their discussion was about the changing role of the teacher resulting from multiculturalism and changes to the student body. In the second interview their answers indicated a shift to a view that the actual behaviours of teachers themselves needed to shift rather than just their knowledge of the backgrounds of their learners. They discussed the need for teachers to be "future-focused educators" and stated that, if that is the case, there would be

a need for them to "have to be future focused thinkers". This theme of teachers changing their behaviour continued when P4 further discussed the link between knowledge and education noting, in their second interview, that "for the actual disruption to education it needs to have teachers who can personally think for themselves in a different way and act in a different way and not just do better". P4 also questioned "how teachers make that step change". They also discussed the need for teachers to belong to communities of learners and to be life-long learners themselves, something which they had not mentioned in the first interview.

During interview 2, P2 was asked whether their views on knowledge had changed and, whilst they thought that they had changed, they said they were struggling with a new definition since knowledge is still measured by assessment in most educational establishments. They did then talk about teachers needing to "provide more than one way of learning" for students and they also talked about teachers working in different ways than they had traditionally been used to. In relation to how necessary they felt it was for teachers to be knowledgeable they stated "people probably don't have to be as knowledgeable as they did before because of what is available and the technological change and the shift we are seeing". P2 felt also that their own teaching methods had shifted because they had been challenged by the think tank discussions and that if teachers "get the chance to challenge [their] thinking [they] can make huge progress".

During the first interview, when asked how important or necessary it is that teachers are very knowledgeable, P5 stated that: "teachers need to gain the respect of their students and being knowledgeable about their discipline is one way of doing that". During the second interview when P5 was asked the same question, they stated that teachers have to be "very broadly skilled, very broadly knowledgeable", they did not mention subject disciplines when answering this question. They also discussed the importance of diversity in teachers at the second interview but not the first.

P6, when asked about the link between knowledge and education in his first interview noted that "it is so backwards to think that we have been churning out the same knowledge for the last 50 years" but they did not mention the role of the teacher and how that could change. In the second interview, when asked the same question, P6 stated that "somehow we [teachers] have to become more flexible but most people are not good at that". They discussed the need for educators "to take risks" and noted that teachers are "quite defensive about what they know and what they don't know" and that this does not improve things. P6 continued with this line when asked about how important it is that teachers are very knowledgeable, they stated "we need multiple skills, we can't just be an expert on a subject" whereas in the first interview they had discussed the need to be flexible only because the students differed each year.

P3 when asked how knowledge and education are related, stated that educators need to "start questioning the value of education as we know and have practiced it, and are still practicing it and people touch on it, but I think if we are going to be transformational and attend to our current kids needs we have to have those serious discussions". They also said in the second interview "kids having a knowledge mentor almost is more powerful for me than having a

teacher who knows their subject". In the first interview, answering the same question, this participant discussed knowledge being "too often the basis of how we teach". Therefore, for this participant, it would seem that there had not been an actual shift in their thinking. Rather, it was apparent from their answers that the shift had been in that they were looking for solutions and asking questions as opposed to identifying the problems.

4.3.3   Participants discussed the need for a transformation in education

Many of the think tank participants talked, at their second interview, about a need for a disruption or transformation in the education system itself. These views were not expressed in the first set of interviews for the participants discussed below.

P5, when discussing the link between knowledge and education in the first interview, did not touch on alternative forms of education other than schools, they said the link between knowledge and education was about "truth and reality". During the second interview, P5 did discuss alternative forms of education and stated: "there are the forest schools and unschooling - there are things that even 10 years ago would be so counter-cultural but they are being accepted and there is a sort of movement towards them, which is healthy I think". They also said "underpinning it is the belief that older models are not working and we need to innovate and so I think that is really important".

Most of the participants mentioned the restrictions that assessments place on teachers at some point in either interview. During the second interview, P6 wondered "are there schools in the world that have no assessments and education is just about learning and gaining knowledge without the tests. Why does it need to be tested in that way?". P6 and P5 also mentioned the complexity of schools with P6 questioning "in the position of education how can we become more like those people who are shifting their brains and thinking those complex things" and P5 stating "I am very interested in complexity thinking because that just really resonates. I am really interested in exploring that further". This was in response to the question 'are there aspects of knowledge that the think tank sessions, or maybe these questions have made you wonder about?', suggesting that an interest in complexity thinking had arisen for P5 as a result of the think tank sessions.

P4, when asked about aspects that the think tank sessions had made them wonder about pondered, "if we are looking at…having the students creating new knowledge and finding solutions to problems…like global warming, climate change and other things…to be able to lead students to have the capacity to solve these problems, that kind of question of what is my role". This would suggest that P4 is considering how education can develop ability in a student rather than giving them factual knowledge.

4.4   Summary

This chapter has given an account of the results and key findings of the research project in relation to the research questions:

- What is the nature and extent of a group of teachers' interactions as they participate in a think tank set up to foster collegial professional debate?
- To what extent do these interactions impact on the teachers' views of knowledge and education?

The nature and extent of the participants' interactions has been discussed together with the apparent impact on the participants' views of knowledge and education. It was found that numerous interactions had occurred. These appeared to directly result from participation in the think tank. In addition, there appeared to be a shift in the views of knowledge and education in the think tank participants.

The next chapter discusses the findings of the study in relation to the literature reviewed in Chapter Two of this thesis.

Chapter Five: Discussion of Findings

5.1   Introduction

In this chapter the main findings from this project are interpreted and discussed in relation to the four bodies of literature reviewed in Chapter Two: future-focused education, teacher professional learning and development, complexity thinking and adult cognitive development. The first two subheadings structuring the discussion are derived from the research questions:

- the nature and extent of think tank members' interactions
- the extent to which interactions impacted on the teachers' views of knowledge and education

The final part of the discussion considers the implications that the findings may have for teacher PLD in the knowledge age. Following that, some conclusions and recommendations are offered.

5.2   The nature and extent of think tank members' interactions

The data suggests that there were numerous interactions between participants and that these interactions would not have occurred if the participants had not been members of the think tank.

This finding is of significance for several reasons. Firstly, interactions between teachers are considered key to the development of higher levels of expertise by a number of educationalists: for example, the professional capital literature, outlined in Chapter Two of this project. Specifically, Hargreaves and Fullan (2012), discuss a collaborative culture in which disagreement between community members is encouraged so that new ideas can be shared and developed. Hargreaves and Fullan identify a need for teachers to cultivate professional capital in themselves if they are to be able to develop high capabilities in their students. They describe professional capital for a teacher as made up of three kinds of capital:

- human capital, for example, knowledge of subject and how to teach it, understanding how children learn and understanding diverse cultures
- social capital which exists in the relationships among people and refers to:

    > how the quantity and quality of interactions and social relationships among people affects their access to knowledge and information; their senses of expectation, obligation and trust; and how far they are likely to adhere to the same norms or codes of behaviour. (p. 90)

- decisional capital ("the ability to make discretionary judgements" (p. 93).)

The social capital to which Hargreaves and Fullan (2012) refer is thought to be at the centre of the growth of collective efficacy and enables the development of higher accomplishments than in groups where it is lacking. Social capital also builds resilience in people since they can gain confidence in the knowledge that advice and support is available when it is required. In

considering the development of social capital, both the quantity and the quality of interactions is of importance. In the context of this project, the use of words such as "deep", "in-depth" and "questioning" when participants described conversations in which they had engaged resulting from the think tank, would suggest that the quality of the interactions amongst participants was high.

Whilst numerous interactions were uncovered when analysing the interview transcripts, it is impossible to know for certain how many more interactions and discussions occurred as a result of the participants' involvement in the think tank. For example, it was noted that another satellite group developed which used the think tank topics as a focus for their discussions, but this was not an original objective of the think tank. This is an example of how a small scale change can produce much bigger shifts in outcome and also shows that consequences of change are almost impossible to predict accurately in a complex system (Snowden & Boone, 2007).

The second important finding is that the development of a community to enable research-informed collaboration appeared to encourage interactions that were specifically about education and based on current educational research. This has important implications for teachers and schooling.

The think tank was a deliberately developed community of diverse teachers and the development of these kinds of communities is seen by some future-focused educationalists as an important aspect of encouraging the professional capital of teachers. For example, Hargreaves and Fullan (2012) state that:

> if we want to improve teaching and teachers, we must…improve the conditions of teaching that shape them, as well as the cultures and communities of which they are a part. (p. 45)

The think tank was an organised community facilitated by an outside expert. Belonging to this community encouraged interactions. Without the think tank it seems unlikely that the high levels of interactions would have taken place. As Hargreaves and Fullan (2012, p. 45) go on to claim, "sustainable improvement can...never be done to or even for teachers. It can only ever be achieved by and with them".

Teacher PLD needs to provide time for teachers to have to themselves in order to figure out how to develop the profession for the knowledge age. Teachers need to be given the trust and space to work this out for themselves rather than having reform thrust upon them. The think tank provided these opportunities. As Bull and Gilbert (2012) point out, in 21st century learning environments it is necessary for teachers to be able to work together in "communities of practice"; in this way, teachers become learners who learn alongside others.

These communities of practice, designed to expand collective knowledge of the teachers' shared venture, can be linked to research around the successes of "deliberately developmental organisations" (Kegan, Lahey & Miller, 2016). The think tank involved in this project incorporates some elements of a deliberately developmental organisation (DDO) as discussed in Chapter Two of this project. Kegan, Lahey and Miller (2016) suggest that the key to success

for an organisation is to make the culture the actual strategy and to aim to develop every single member of the organisation. A DDO works on the premise that members of the organisation should feel that their work intrinsically involves bettering themselves. According to Kegan, Lahey and Miller, in non-deliberately developmental organisations, many members are employed in a "second job" which involves covering up what they see as their own inadequacies of the role; this second job is hugely wasteful of resources and creates a negative culture. A DDO encourages members to present their weaknesses and to use them as a talking point and opportunity for further growth and development. The communities of practice described by Bull and Gilbert (2012) provide a platform for this to happen. Where members of an organisation are given the opportunity to consider where they are at present and compare that with where they could be, what the gaps are and how changes and growth could lead to the betterment of themselves and the organisation, organisations can expect to see an escalation in improvements which actually make a difference.

If all this is accepted, then the types of interactions found in this study are of importance. Face-to-face conversations and, to a lesser extent, online discussions were the main types of interactions occurring as a result of the think tank and regarding the think tank topics. The data showed that many conversations took place both within and outside of the think tank meetings directly as a result of the topics of conversations within the meetings and these conversations increased in number over the course of the time the think tank ran. The importance and significance of actual bodily meetings is debated by Claxton (2016) in *Intelligence in the Flesh,* in which he suggests that cognition is influenced by the body and not just the brain, as he claims has been suggested in the past. Claxton (2016, p. 210) proposes that "our bodies are in a state of continual resonance with those around us", and he asserts that good communication depends on actual bodily meeting. The data would suggest that the think tank had encouraged a number of face-to-face discussions which would not have occurred between people had the think tank not existed.

Hargreaves and Fullan (2012, p. 150) suggest that successful movements occur when there is dissatisfaction in a system. The following comment by one participant: "in my eight years....I am finally being challenged" would suggest previous dissatisfaction. Hence, the readiness of this participant to consider a new perspective.

5.2.1   The extent to which participants' interactions impacted on their views of knowledge and education

I identified a total of 37 instances of apparent changes of views of knowledge after the think tank sessions, with five of the seven members of the think tank expressing a change in their views of knowledge. There were instances of teachers changing their views on how knowledge impacts on education and changes of their views on education itself. Some participants discussed the need for a "transformation" towards a more "future-focused model" of education. This would suggest that teachers' discussions within and outside the think tank and subsequent conversations with their peers, which were the main components of the think tank, created some shift in their views on knowledge and education. The actual extent of this shift is

difficult to quantify and furthermore, whether this shift was enduring was not measured or considered. Although, for the duration of the think tank, the data does suggest that there were alterations in the participants' views on knowledge and education which did arise directly from the interactions participants had as an outcome of the think tank sessions.

This is important for a number of reasons. Primarily, research (e.g. Berger & Johnston, 2015) suggests that if we are to have improvements in performance within structures and organisations, then changes need to be made. Additionally, without the joining together of people with differing views to create new ways of thinking, it is unlikely that people will embrace change. People tend to converse and interact with others who share their views in "filter bubbles" (Pariser, 2011). This is a problem since, according to future-focused educationalists, outside of the realm of education, knowledge has already changed. If schools and teachers do not embrace these changes, it could create a situation where the education system becomes so outmoded that it serves no real purpose. Therefore, it is with some urgency that we need to consider how we can facilitate situations and environments where teachers can articulate their current views and consider the differing and opposing views of others. This process is likely to be uncomfortable and destabilising for teachers as it will inevitably bring situations where long held, deeply embedded beliefs are challenged and thinking which may have seemed common sense is questioned and debunked.

Gilbert (2005, p. 68) discusses "mental models"; that is, structures which give us a framework for our thinking. Eventually these models become so ingrained in our everyday thoughts that they seem to be factual common sense. Many people hold a mental model of the education and schooling systems and often this mental model is based on their own experiences. Therefore, they hold seemingly common sense views of what the schooling and education systems should look like. It appears that when a context changes, mental models may become dysfunctional and actually constrain rather than develop our thinking (Gilbert, 2005). Gilbert (2005, p. 77) maintains that "we have yet to refocus our schools so that they see their core activity as building the capacity for knowledge production". Schools need to be able to teach students how to do things *with* knowledge and for this to happen teachers must shift their mental model of knowledge and how it relates to education. Results of this study would suggest that the think tank model created the space, time and opportunity for teachers to begin to undergo this shift.

By bringing together participants from different areas of the school, different points in their careers, and with different job titles and roles, the think tank gave members the opportunity to consider differing views and to take the time to reflect on their own mental models. The think tank appeared to give members the chance to begin the process of moving to the next level of cognitive development as discussed in Chapter Two.

Berger and Johnston (2015) expand on the idea of deliberately developmental organisations as establishments where there is steady improvement in performance without continuing what is already being done. They share their belief that leaders need to shift towards expecting a growth mindset and to purposefully create practices which support development whilst at the same time diminishing practices which get in the way of creativity and growth. Berger and

Johnston maintain that for many organisations there is separation between a person's regular work and their professional development. Professional development is commonly seen as something which is carried out in time spent away from their core work. They call for a synergy between the two, the development of a culture in which professional development is happening in a seamless way each and every day. Whilst the think tank investigated in this study enabled periodic seminars in which participants were able to meet and share ideas, it also created a community of members who interacted outside those set times. Additionally, participants of the project engaged in interactions as a result of the think tank with non-participants, sharing ideas discussed at think tank seminars. In this way professional development of each participant began to interweave with their regular working day. This idea is developed further in the conclusions and recommendations from this research project.

5.2.2   The significance for PLD in the knowledge age

As we continue to transition into the knowledge age, whilst some of the current research on teacher PLD focuses on the need for teacher PLD to facilitate collaboration and debate, most current teacher PLD programmes continue to focus on "informational" learning (Gilbert & Bull, 2015; Santamaria & Santamaria, 2012; Timperley, 2011). It would appear that the facilitation of collaboration and robust debate between teachers is difficult to attain and the traditional model of informational learning is the more likely go-to for PLD. This standard model of the passing on of information may have some impact on teachers' thinking but it is unlikely to produce actual changes in practice (Timperley, Wilson, Barrar & Fung, 2007). The research outlined in Chapter Two of this thesis points to the need for new forms of PLD which provide opportunities for deep, robust, sustained debate between teachers with differing views and opinions. Solutions to the complex problems currently facing education are far more likely to be found by the facilitation of high quality, multiple interactions between people than by one person providing solutions to a group of followers. It is essential that teachers are given opportunities to become part of professional communities which have time and space to consider current best practices. These professional communities are the vehicle for which professional capital may best be developed; "professional capital is about communities of teachers using best and next practices together" (Hargreaves and Fullan, 2012, p. 51).

The development of a "collaborative culture" encourages discussion where there is disagreement and has been shown to build collective capacity (Hargreaves & Fullan, 2012, p. 13). The think tank seemed to achieve the facilitation of collaboration and robust debate by deliberately bringing together teachers with different experiences and views, and facilitating and encouraging high quality discussion. It was found that there were numerous interactions between these teachers, which would not have happened had the think tank not existed. Additionally, with no one participant having the answers to the complex problems under consideration, a situation was produced whereby "the smartest person in the room was the room itself" (Weinberger, 2011). That is, only through high quality interactions and further questions could the issues under discussion be properly addressed. The provision of opportunities for "the room" to become the place where complex problems are addressed would

appear to be an essential component of teacher PLD if we are to see the changes needed in the education system as we move forward into the knowledge age. Only when the spaces between the people become more important than the individual people's views will we attain the huge shifts required to make those changes.

The involvement in the think tank community enabled the participants to view their PLD as a way to better themselves rather than giving them another job to do. The think tank participants were not given a task to finish by a certain deadline, rather they were given time and space to debate and work collaboratively over time to develop key principles. This approach gave participants of the think tank time to consider the complex questions under review. As Claxton (1999) notes, speed of decision making does not necessarily point to a favourable outcome. Spending time on decisions means that a range of views can be considered. Additionally, the question of "what needs to be done next?" becomes more and more complex as things progress (Claxton, 2016) and fast decisions to complex problems rarely hold any weight. Sporadic PLD sessions which aim to solve complex problems in a short time are unlikely to have impact, and this has implications for the structure of teacher PLD into the future. The "needs, deeds and see'ds" which Claxton (2016) sees as constantly reverberating in our brains are what makes us ready for action and change. It is aspects which were not predicted which get passed to a higher level of thinking and create transformational learning. As we move forward, it is essential that teacher PLD does provide cognitive challenge including unpredictable outcomes and also the space and time to engage in intellectual thought and discussion based on intuition and supported by research.

The organisation of a space for connections and collaboration in which each person's contribution and voice are valuable would appear from this study to create the environment where a person's meaning making system can shift. This embodiment of learning is discussed by Claxton (2016) who emphasises the importance of intuition and notes the absolute need for discussion to encourage this. The support of each person's personal cognitive growth can move the view of PLD as another job to a view of it as essential for the growth of each individual. Continuous learning, supported by research and requiring collaboration can be transformational for teachers.

5.3   Summary

This chapter has been a discussion of the research findings in relation to the literature reviewed in Chapter Two. It is suggested that the significance of the number of interactions between participants is related to the possibility of the development of professional capital within the participants. Additionally, the importance of the deliberate development of a community of professionals is discussed in relation to the significance of embodiment in bringing together different views and opinions in teacher professional learning and development. Finally, the discussion considers the implications that the findings have for teacher PLD in the knowledge age specifically in the provision of opportunities for continuous professional learning and development, supported by current research which is collaborative. It is acknowledged that these ideas may be uncomfortable and destabilising for teachers.

Chapter Six: Conclusions, Implications and Recommendations

6.1   Introduction

The following chapter is a summary of the conclusions, implications and recommendations resulting from the study along with a discussion of its strengths and limitations. The implications for future research and are also proposed.

6.2   Conclusions to Findings and Implications

The intervention of the think tank did appear to provide the right set of conditions which could start to enable participants to rethink their views and, therefore, possibly undergo transformational learning. The think tank provided a form of teacher PLD unlike the current norm of sharing ideas and information dissemination. This PLD was centred on informed, robust collaborations, it was based on current research, and it allowed for intuition and embodied ways of thinking. The findings suggest that this type of environment could help teachers to shift their thinking. Under the conditions of the think tank, teachers were found to change their views, to consider alternative points of view, and to discuss ambiguities. It would appear from this case study that allowing diverse groups of teachers time, space and facilitation to discuss educational issues in the knowledge age enables further interactions which could shift their views and perceptions.

For these interactions and possible transformations to take place effectively, schools must be treated and viewed as the complex systems that they are. Complexity thinking helps us to think about what is possible rather than what is probable (Berger & Johnston, 2015), but in order to do this we need to ask different questions, take multiple perspectives and see systems. Only by developing these new habits of mind will we be enabled to make the revolutionary changes needed in the education system. Continually repeating cycles of problem definition, data collection and experimentation are essential components of the new ways we need to view teacher PLD.

The separation of work from learning for teachers is unlikely to bring about change (Berger & Johnston, 2015). On the other hand, if schools become deliberately developmental organisations (Kegan, Lahey & Miller, 2016) in which each member of the organisation is expected to grow and develop and where regular work is linked with PLD, transformations in teacher thinking will likely be possible.

6.3   Recommendations

Recommendation One: Set up conditions within which it is possible for PLD to allow for
informed, robust discussion that can be sustained over long periods

The main recommendation arising from this study is for teachers to be provided with
opportunities for PLD which differ from the current norm. These new opportunities for PLD
should give the participants chance to engage in informed, robust discussions. One way of
providing these opportunities in schools is to set up professional communities and think tanks
which are given time and space to develop professional capital (Hargreaves & Fullan, 2012).
The development of strong collaboration requires a commitment to moving forward together as
a team whilst maintaining informal collaborative relationships. In the school under study for this
project, the team commitment was partly established by approaching individuals from across
the school to take part in the think tank, but then asking them to establish the meeting times and
structures for the think tank. With these elements in place it was then possible to build "new
norms founded on trust" (Hargreaves and Fullan, 2012, p. 114) which is an important aspect of
giving participants opportunities for transformational learning. The joining together of a range of
teachers with the purpose of innovation based on current research is likely to facilitate the
robust challenging discussions needed for schools to make the transformations advocated by
future-focused educationalists.

Recommendation Two: Encourage diversity in collaboration

Collaborative schools are more effective and do better than individualistic schools (Rosenholtz,
2000). Teachers need be given opportunities to develop collective strength, through working
together with other teachers in cross-disciplinary teams or syndicates (Gilbert, 2005, p. 206). It
is important that professional communities of teachers are diverse (Hargreaves & Fullan, 2012).
When teachers spend all of their time in one faculty together with colleagues who share and
affirm each other's opinions, then there may develop a homogeneity of principles and values
which are never questioned. The re-culturing of a school to eliminate individualism must be
carefully thought out if it is not to develop a culture in which every individual thinks in the same
way. Therefore, schools need to develop systems to enable this collective strength to grow and
develop. This may involve the formation of learning communities, or think tanks, timetable
organisation and the development of teacher databases and community contacts. School
leaders should consider ways to scaffold different forms of teacher collaboration and continue to
question whether they offer opportunities for authentic contexts in which teachers are able to
consider different ways of thinking. In this way, school cultures which embrace diverse thinking
can be nurtured and homogeneity of values and thinking can be questioned in a safe
environment. Fullan (2011, p. 47) discusses situations where teachers from different schools
learn from each other which he terms "lateral capacity building". This links with recent Ministry of
Education initiatives around the formation of Kāhui Ako (Communities of Learning) which can
help school leaders to structure and facilitate this kind of collaboration. It should be noted,
however, that merely putting together groups of teachers from different schools will not foster

the debate necessary to challenge thinking. The conditions for effective and challenging interactions in a safe environment should be carefully planned. It should also be acknowledged that the process of having long-held beliefs and opinions challenged would likely be uncomfortable and destabilising for teachers and school leaders should ensure that teachers are supported to share their differing views in an unthreatening atmosphere of trust.

Recommendation Three: Engage an outside expert facilitator

The development of a culture where failure and uncertainty are embraced and disagreement is seen as a necessary element for growth is difficult to achieve. In such collaborative cultures, open discussions and debate cannot be seen as a threat to relationships. The development of such a culture requires thought, time and care. Transformational professional communities of teachers need to be informed by evidence and are pushed forward by facilitated, challenging conversations. To this aim, an outside expert is necessary. This outside expert, or facilitator, is able to view the group through an alternative lens and can, therefore, work deliberately to enable participants to question their own meaning making systems and assist people to work together and observe their shared venture in new ways.

Recommendation Four: Treat teacher PLD as a complex issue

It is essential that teacher PLD is treated as the complex issue it is. Within this, cyclic repetitions of problem definition, data collection and experimentation are essential since these processes themselves can change thinking and actions (Berger & Johnston, 2015, p. 53). Teacher PLD should be interwoven with daily practice and not seen as an extra job. The understanding that teacher PLD is essential for the growth of the individual is an important aspect of creating authentic learning which may enable a shift in thinking for teachers. Therefore, it is essential that teacher PLD is continuous and supported by current and relevant research. Additionally the focus on feedback is an essential aspect of a complex structure. According to Berger and Johnston (2015):

> the need for more people to have more access to feedback is the difference not only between good teams and great ones, but also between those that can rise to the changes in context and those that get swept under. (p. 69).

6.4   Strengths and Limitations of the Study

The complexity informed case study approach to this project incorporating qualitative methods was a strength as it enabled the findings to evolve over time and the complexity of the question being addressed was taken into account. Since the study was an exploration of the participants' meaning-making, the qualitative approach was appropriate and the learning context of the participants was reconstructed from their own accounts. A further strength derived from the familiarity and trust between the participants and the interviewer which meant that the participants were likely to feel comfortable to share their views openly. Being an active participant, as well as the researcher, I was able to interact with the complex case as it developed and, therefore, respond to the case as it emerged. A further consideration arising from this aspect was that the familiarity between the interviewer and the participants could have had a negative impact in that they may have thought that I needed to hear something to help my study and felt the need to tell me what I wanted to hear. There was an attempt to minimise this by discussing with each participant at the start of each interview the importance of participants giving their own, honest views. There were also discussions at the start of each interview regarding the fact that the interview questions had no right or wrong answers.

Once both of the interviews had been transcribed and evaluated, I felt that I required the participants to answer further questions to enable the research questions to be answered sufficiently. Due to my location and position as the researcher this was relatively easy to implement and so this was a further strength. That is, since I was employed at the school where the think tank was set up, it was easy for me to talk to the participants and ask if they would consider answering further questions for my study. Once I had done this, using the school email, it was possible to send a simple Google Form from which they could answer the questions in their own time. Therefore, whilst there were considerations to be addressed due to the fact that I was involved directly in the intervention under study as well as being the researcher for this project, I believe that the benefits outweighed the problems which could have arisen from this and that this was an overall strength of the study.

As indicated in Chapter Four of this project, there was a weakness in the research design which was only uncovered once I had completed the interviews. Thas is, it was difficult to ascertain the actual numbers of conversations interviewees had undertaken because they discussed talking with family members or colleagues without stating specifically how many people they were referring to or how often they had engaged in conversations. Time pressures together with the amount of time which had lapsed between uncovering this weakness and the interviews taking place meant that I was unable to go back and reveal exactly how many conversations had occured. Since I was not able to uncover accurately how many people had been involved in conversations, the number of conversations I recorded was the minimum which could have taken place and there was a possibility that there were many more. Consequently, the 59 clusters of conversations which I recorded was the minimum number which arose from the think

tank. In my view, this weakness of the research design, whilst a significant limitation to the study, does not lead to the project becoming invalid since it leads to an under assessment rather than an over assessment of the impact of the think tank.

In considering the participants involved in the study, the involvement of the Principal of the school as one of the participants may be regarded as a limitation. It could be supposed that the involvement of the Principal would constrict the other participants in sharing their honest views. Since the participants had already been carefully chosen as those people who are known to engage in robust discussions and thought regarding education this was not thought to be a major limitation. Additionally, as the researcher and knowing all of the people involved in the intervention, I do not believe that this was a limitation of the study.

The small sample size involved in this study may also be seen as a limitation. Nonetheless, it should be noted that the study is an indicative measure. That is, I was considering the possibility of an intervention having an impact on teachers' views and so taking a small but diverse group of people to investigate enabled me to consider each individual carefully. Additionally, the small sample size enabled complexity reduction which is considered by some a necessity and often a strength for case studies in education (Hetherington, 2013).

There were also a number of time pressures which may have impacted on the project:

1. I underestimated the time needed for each interview since, as I am familiar with each of the participants, there was time needed for pleasantries and this was not taken into account. This time at the start of each interview was quite important as it set a tone of comfort and ease but I had not factored it in initially and, therefore, some of the later questions were slightly rushed for some of the participants.

2. There were time pressures on the participants themselves as they were fitting the interviews into their already busy working days as teachers. I felt that, had we had more time for each interview with less need to move on with the ringing of the school bell, the data collected could have been richer. This became apparent to me once I transcribed the interviews as I realised that when each participant was discussing knowledge I should have prompted them to tell me more about their thinking rather than moving on to the next question in an aim to get through all of the questions.

6.5   Further research needed

The findings of this study would suggest that teachers can undergo shifts in their views, which could possibly lead to transformational learning, if provided with the right set of conditions. Whether the shifts in views were enduring in the think tank teachers was not considered in this project. There were two members of the think tank who were very keen drivers in keeping the think tank moving and progressing, working alongside the outside expert to ensure the think tank continued. Both of these participants are no longer working in the school where the think tank intervention took place and I have since heard informally that the think tank sessions are no longer continuing. Further study could involve an investigation of the factors that enable endurance of such a programme.

References

Beare, H. (2001). *Creating the Future School.* London, United Kingdom: RoutledgeFalmer doi:10.4324/9780203132074

Beeby, C.E. (1986) Introduction. In W Renwick (Ed.), *Moving targets: Six essays in* educational *policy* (pp. xi–xiv). Wellington, New Zealand: New Zealand Council for Educational Research.

Bereiter, C. (2002). *Education and mind in the knowledge age.* Manwah, NJ: Lawrence Eribaum.

Bereiter, C. & Scardamalia, M. (2014). Knowledge building and Knowledge creation: One concept, two hills to climb. In S. C. Tam, H. J. So & J. Yeo (Eds.) *Knowledge creation in Education* (p. 35-52). Singapore: Springer.

Berger, J. G. (2002). *Exploring the connection between teacher education practice and adult development theory.* Unpublished doctoral dissertation, Harvard University. http://www.sciepub.com/reference/89198

Berger, J. G. (2007). Developing the teachers we need for the schools we want. *Set*, 2007(3), 26-38. NZCER Press.

Berger, J. G. and Johnston, K. (2015). *Simple habits for complex times: powerful practices for leaders.* Stanford, CA: Stanford University Press.

Biesta, G. (2013). Cultivating humanity or educating the human? Two options for education in the knowledge age. *Asia Pacific Education Review,* 15(1), 13-19. doi:10.1007/s12564-013-9292-7

Bloom, H. (2001). *Global brain: the evolution of mass mind from the big bang to the 21st century.* New York, NY: John Wiley & Sons.

Bolstad, R. (2011). Taking a future focus in education – What does it mean? *Future focused issues in education project*: NZCER Press.

Bolstad, R. & Gilbert, J., with S. McDowall, A. Bull, R. Hipkins & S. Boyd, (2012). *Supporting future-oriented learning and teaching - a New Zealand Perspective. Research report prepared for the Ministry of Education.* Wellington, New Zealand: Ministry of Education

Bull, A. & Gilbert, J. (2012). *Swimming out of our depth? Leading learning in 21st century schools.* Wellington, New Zealand: NZCER. http://www.nzcer.org.nz/research/publications/ swimming-out-our-depth-leading-learning-21st-century-schools

Brynjolfsson, E., & McAfee, A. (2012). *Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy.* Lexington, MA: Digital Frontier Press.

Castells, M. (2000). *The rise of the network society.* Oxford, England: Blackwell.

Claxton, G. (1999). Hare brain, tortoise mind: How intelligence increases when you think less. New York, NY: Ecco.

Claxton, G. (2008*). What's the point of school?: Rediscovering the heart of education .* Richmond, VA: Oneworld.

Claxton, G. (2016). *Intelligence in the flesh: why your mind needs your body much more than it thinks.* New Haven, CT: Yale University Press.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education.* New York, NY: Routledge.

Costa, A. L., & Kallick, B. (2009). *Learning and leading with habits of mind: 16 essential characteristics for success.* Moorabbin, Vic.: Hawker Brownlow Education.

Creswell, J. (2014): *Research design. Qualitataive, quantitative and mixed methods approaches.* (4th ed.) Lincoln, NE: Sage Publications.

Crotty, M. (2005)*. The Foundations of social research: Meaning and perspective in the research process.* London, United Kingdom: SAGE.

Daniels, H., Lauder, H. & Porter J. (2009). *Knowledge, values and educational policy – a critical perspective.* London, United Kingdom: Routledge.

Davis, B. & Sumara, D. J. (2005) Challenging images of knowing: complexity science and educational research. *International Journal of Qualitative Studies in Education*, 18(3), 305-321. doi: 10.1080/09518390500082293

Davis, B., & Sumara, D. (2008). Complexity as a theory of education. *Transnational curriculum inquiry 5(2).* Retrieved April 22, 2017, from http://nitinat.library.ubc.ca/ojs/index.php/tci

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research.* Thousand Oaks, CA: Sage Publications.

Dewey, J. (1938). *Experience and education: by John Dewey.* Indianapolis, Canada: Kappa, Delta, Pi.

Drago-Severson, E. (2004). *Helping teachers learn: principal leadership for adult growth and development.* Thousand Oaks, CA: Corwin Press.

Drago-Severson, E. (2007). Helping teachers learn: Principals as professional development leaders. *Teachers College Record*, 109(1), 70-125.

Drago-Severson, E. (2012). *Helping educators grow: Strategies and practices for leadership development.* Cambridge MA: Harvard University Press.

Egan, K. (2008). *The future of schooling: Reimagining our schools from the ground up.* New Haven, CT: Yale University Press.

Egan, K. (2010). *The educated mind: how cognitive tools shape our understanding.* Chicago, Ill: Univ. of Chicago Press.

Evans, R. (2012) Getting to no: Building true collegiality in schools. *Independent school 71(2).* Retrieved January 16, 2017, from http://www.robevans.org/Pages/prodev/getting2no.htm

Facer, K. (2011). *Learning futures: Education, technology, and social change.* London, United Kingdom: Routledge.

Fink, D., & Stoll, L. (2005). Educational change: Easier said than done. In A. Hargreaves (Ed.), *Educational change; international handbook of educational change* (pp 17-41). New York, NY: Springer.

Fontana, A. & Frey, J.H. (2005). The interview: From neutral stance to political involvment. In Denzin, N.K., & Lincoln, Y.S. (eds.), *The Sage Handbook of Qualitative Research. 3rd ed.* Thousand Oaks, CA: Sage, (pp. 695–728).

Fullan, M. (2001). *Leading in a Culture of Change.* San Francisco, CA: Jossey-Bass.

Fullan, M., Hill, P., & Crevola, C. (2006). *Breakthrough.* Thousand Oaks, CA: Corwin Press.

Fullan, M. (2011). *The six secrets of change: What the best leaders do to help their organizations survive and thrive.* San Francisco, CA: Jossey-Bass.

Fullan, M. & Scott, G. (2014). New pedagogies for deep learning. Seattle, WA: Collaborative Impact SPC. Retrieved 7 July, 2018, from http://www.michaelfullan.ca/wp-content/uploads/2014/09/Education-Plus-A-Whitepaper-July-2014-1.pdf

Fuller, R. B. (1981). *Critical path.* New York, NY: St. Martin's Press.

Gawande, A. (2007). *Better: A surgeon's notes on performance.* New York, NY: Henry Holt.

Gibbs, G. (2007). *Qualitative data analysis: Explorations with NVivo.* Maidenhead, United Kingdom: Open University Press.

Gilbert, J. (2005). *Catching the knowledge wave? The knowledge society and the future of education.* Wellington, New Zealand: NZCER Press.

Gilbert, J. (2012). Science 2.0 and school science*. New Zealand Science Teacher*, 131, pp. 5–9

Gilbert, J. & Bull, A. (2015). *On the edge: Shifting teachers' paradigms for the future*. Final report to the TLRI. Retrieved April, 22, 2017, from http://www.tlri.org.nz/sites/default/files/projects/TLRI%20_%20Gilbert%20_%20Summary.pdf

Gillham, B. (2000). *Case study research methods.* London, United Kingdom: Continuum.

Hargreaves, A. & Fullan, M. (2012). *Professional capital: Transforming teaching in every school.* London, United Kingdom: Routledge.

Hargreaves, A. (2003). *Teaching in the knowledge society: Education in the age of insecurity.* New York, NY: Teachers College Press.

Hetherington, L. (2013). Complexity thinking and methodology: The potential of "Complex case study" for educational research. In *Complicity: An International journal of complexity and education*, 10(1/2), 71-85.

Hood, D. (2001). *Our secondary schools don't work anymore: Why and how New Zealand schooling must change for the 21st century.* Auckland, New Zealand: Profile Books.

Jackson, A.W. & Davis, G.A. (2000). Turning points 2000: Educating adolescents in the 21st century. New York, NY: Teachers College Press.

Johnson, S. D. (1995). Will our research hold up under scrutiny? *Journal of Industrial Teacher Education,* 32(3), 3-6.

Jones, A. (1995). *Myths and realities: Schooling in New Zealand.* Palmerston North, New Zealand: Dunmore Press.

Kegan, R. (2000). What "form" transforms? A constructive-developmental approach to transformative learning. In J. Mezirow and Associates (Eds.), *Learning as transformation: Critical perspectives on a theory in progress* (pp. 35–69). San Francisco, CA: Jossey-Bass.

Kegan, R. (2003). *In over our heads: The mental demands of modern life.* Cambridge, MA: Harvard University Press*.*

Kegan, R., Lahey, L. L., & Miller, M. L. (2016). *An everyone culture: Becoming a deliberately developmental organization.* Boston, MA: Harvard Business Review Press.

Knowledge Triangle and Innovation - European Commission. (n.d.). Retrieved December 28, 2017, from http://ec.europa.eu/education/policy/higher-education/knowledge-innovation-triangle_en

Kotter, J.P. (2006). *Leading Change.* Boston, MA: Harvard Business School Press.

Leadbeater, C. (2000a). *The weightless society: Living in the new economy bubble.* New York, NY: Texere.

Leadbeater, C. (2000b). *Living on thin air.* London, United Kingdom: Penguin/Viking.

Leadbeater, C. (2011). *Rethinking innovation in education: Opening up the debate.* Melbourne, Australia: Centre for Strategic Innovation.

Lincoln, Y.S. & Guba, E.G. (1985). *Naturalistic Inquiry.* Newbury Park, CA: Sage Publications.

Mathison, S. (1988). Why triangulate? *Educational Researcher,* 17(2), 13–17. doi:10.2307/1174583

McGee, C. (1997). *Teachers and curriculum decision-making.* Palmerston North, New Zealand: Dunmore Press.

McKenzie, J. D. (1983). *Education and jobs, 1984.* Dunedin, New Zealand: New Zealand College of Education.

Mertens, D. M. (2010). *Research and evaluation in education and psychology: integrating diversity with quantitative, qualitative, and mixed methods.* Thousand Oaks, CA: Sage.

Mutch, C. (2013). *Doing educational research: A practitioner's guide to getting started.* Wellington, New Zealand: NZCER Press.

Oliver, R. G. (1998). The Ideological Reduction of Education. *Educational Philosophy and Theory* 3(30), 229–302

Opfer, D. & Pedder, D. (2011). Conceptualizing teacher professional learning. Review of Educational Research 81(3) 376–407. Retrieved July 1, 2018 from http://www.jstor.org/stable/23014297

Patton, MQ. (1999). Enhancing the quality and credibility of qualitative analysis. *HSR: Health Services Research.* 34 (5) Part II. 1189–1208.

Pariser, E. (n.d.). *Beware online "filter bubbles".* Retrieved October 28, 2017, from https://www.ted.com/talks/eli_pariser_beware_online_filter_bubbles

Pinker, S. (2016). *The blank slate: The modern denial of human nature.* New York, NY: Penguin.

Pernecky, T. (2016). *Epistemology and metaphysics for qualitative research.* Los Angeles, CA: Sage.

Plotkin, H. C. (1994). *Darwin machines and the nature of knowledge.* Cambridge, MA: Harvard University Press.

Punch, K. (2014). *Introduction to social research quantitative and qualitative approaches.* Los Angeles, CA: Sage.

Rata, E. (2012). The politics of knowledge in education. *British Educational Research Journal,38*(1), 103-124. doi:10.1080/01411926.2011.615388

Rata, E. (2015). A pedagogy of conceptual progression and the case for academic knowledge. *British Educational Research Journal,* 42(1), 168-184. doi:10.1002/berj.3195

Riley, K. A. (2003). *Whose school is it anyway?* London, United Kingdom: Falmer

Robbins, S. P. & Robbins, S. P. (1993). Organisational behaviour: concepts, controversies and applications: Australia and New Zealand. New York, NY: Prentice Hall Australia.

Robinson, K. (2011). *Out of our minds: Learning to be creative.* Oxford, United Kingdom: Capstone.

Robinson, K. & Aronica, L. (2016). *Creative schools: Revolutionizing education from the ground up.* London, United Kingdom: Penguin.

Robinson, V. (2011). *Student-centered leadership.* San Francisco, CA: Jossey-Bass.

Rockmore, T. (2011). *Kant and phenomenology.* Chicago, IL: University of Chicago Press.

Rosenholtz, S. J. (2000). *Teachers' workplace: The social organization of schools.* New York, NY: Teachers College Press.

Santamaría, L. J., & Santamaría, A. P. (2012). *Applied critical leadership in education: Choosing change.* New York, NY: Routledge.

Sardar, Z. (2010). Welcome to postnormal times. *Futures*, 42(5), 435–444. doi:10.1016/j.futures.2009.11.028

Shuker, R. (1987). *The one best system? A revisionist history of state schooling in New Zealand.* Palmerston North, NZ: Dunmore Press

Simons, H. (2009). *Case study research in practice.* Los Angeles, CA: Sage.

Snowden, D.J. & Boone, M.E., (2007). A Leader's Framework for Decision Making. *Harvard Business Review*, 85(11), 69–76

Snyder, S. (2013). The simple, the complicated and the complex: Educational reform through the lens of complexity theory. *OECD Education Working Papers, No. 96. Paris, OECD:* OECD Publishing.

Strike, K. A., & Posner, G. J. (1985). A conceptual change view of learning and understanding. *L. West & L. Pines (Eds.), Cognitive structure and conceptual* change 259–266. Orlando FL: Academic Press.

Tesch, R. (1995). *Qualitative research: Analysis types and software tools.* New York, NY: Falmer.

Timperley, H. (2011). *Realizing the power of professional learning.* Maidenhead, England: Open University Press.

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration (BES).* Wellington, New Zealand: Ministry of Education.

Toffler, A. (1970). *Future shock.* New York, NY: Random House.

Weinberger, D. (2011). *Too big to know: Rethinking knowledge now that the facts aren't the facts.* New York, NY: Basic Books.

Young, M.F.D., Lambert, D., Roberts, C.R, & Roberts, M. (2014). *Knowledge and the future school: Curriculum and social justice.* London, England: Bloomsbury Academic.

Zealand, E. I. (2017, October 26). *Communities of Learning | Kāhui Ako. Retrieved October 28, 2017,* from https://www.education.govt.nz/further-education/communities-of-learning-kahui-ako-information-for-postsecondary-education-and-training-providers/

Zimmerman, J. (2006). Why some teachers resist change and what some principals can do about it. *National Association of secondary schools bulletin* 90(3): 238-249

Appendices

Appendix A: Ethical Approval

AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

AUT

11 August 2016

Jane Gilbert
Faculty of Culture and Society

Dear Jane

Re Ethics Application: **16/265 Teachers' transformational learning? A case study of teachers' views of knowledge as they participate in a collaborative think tank.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 11 August 2019.

As part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through http://www.aut.ac.nz/researchethics. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 11 August 2019;

- A brief report on the status of the project using form EA3, which is available online through http://www.aut.ac.nz/researchethics. This report is to be submitted either when the approval expires on 11 August 2019 or on completion of the project.

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

Kate O'Connor

Executive Secretary
Auckland University of Technology Ethics Committee

Appendix B: Interview Questions

Interview questions
Part 1
1. Who – if anyone – have you talked to about any of the ideas we've discussed in the think tank? [Names, relationship to you? - e.g. fellow think tank member, other work colleague, other person in education sector, friend, partner, family member etc.] 2. Can you remember how this conversation started? What was it like? – e.g. were you just telling them something interesting? Arguing/debating with them? etc. How long did the conversation go on for before the subject changed to something else? Would you say it was an in-depth conversation? 3. Were any of the conversations you had specifically about knowledge? If so, can you remember how this topic came up? Can you remember what you said? What they said? 4. Did anything about these conversations change/influence your view of knowledge? If so, can you remember how? Or what happened?
Part 2
1. Can you put into words what you think knowledge is? In general terms? In academic contexts? In the school context? 2. How do you think knowledge and education are related? 3. Can you describe what you think knowledge's purpose in the school curriculum is? Is this purpose the same now as it was in the past? How about in the future? 4. How important/necessary is it that teachers are very knowledgeable? In your view, what kinds of knowledge do teachers need? What kinds of knowledge do they need most, do you think? Why is this, in your view? 5. What, in your view, is the relationship between the knowledge we teach in the school 'subjects' or curriculum 'learning areas' and the knowledge that is part of university disciplines (like chemistry, or history or English)? Are they the same, or different? 6. Are some kinds of knowledge harder to learn than others? Why is this, do you think? 7. How, in your view, do you know when someone really knows something? Any other ways? 8. How do you think people 'get' knowledge? Where from? What, in your view, helps them get it? 9. How do you think knowledge grows and develops in the various disciplines – e.g. in science, or in history, or in English? 10. The contestants on quiz shows like Mastermind are portrayed as being very 'brainy' or clever – what's your view on this?

11. Do you ever talk to other people (other teachers, friends, family) about ideas like this? If so, who? Did you do this in other, earlier phases of your life?

12. Are there any aspects of knowledge that the think tank sessions, or maybe these questions, have made you wonder about? Are you curious about something you might not have been curious about before? If so, is this something general, or something specifically related to your work as a teacher? Can you say more about this? Do you think you'll talk about this to someone else? Do you want to?

Second interview only:

1. From what you've just said [in the questions they've already answered], it looks to me as though your views on knowledge might have changed a bit since our last interview. Am I right, do you think?

2. [if they think their views have changed] What do you think might have caused that change?

3. Prompts to draw them out

4. Do you think that your conversations with others (the others could be colleagues, friends family - anyone) over the past 6 months have influenced your views of knowledge?

5. If you do, can you tell me a bit more about these interactions? - e.g. who were they with?, how did they start?, etc.

6. Why/how do you think these interactions influenced your thinking?

7. Were they helpful? Were they positive? can you say more about why?

8. Have you talked to anyone about the aspects you were wondering about when we last talked? Who did you talk to and did the conversation lead to any other questions for you?

Appendix C: Google Form

Conversations following PLD

After taking part in a professional learning opportunity held in school, would you normally discuss your learning with others, even if you were not specifically required to do so?

○ Yes

○ No

If you answered "yes" to question 1, who would you normally discuss your learning with?

Your answer

Do you believe that the think tank sessions encouraged you to initiate more discussions about education than you would normally?

○ Yes

○ No

If you answered "yes" to question 3, please could you give some specific examples (just who the people were, eg faculty colleagues, friends etc)

Your answer

SUBMIT

Never submit passwords through Google Forms.