TEACHERS' THEORIES OF INTELLIGENCE AND INTELLIGENCE FEEDBACK IN SECONDARY EDUCATION ENGLAND

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Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Abstract

Research indicates individuals hold implicit intelligence beliefs on a continuum from an entity theory, where intelligence is fixed, through to an incremental theory, with intelligence recognised as malleable (Dweck, 1999). According to Haimovitz & Dweck (2017) teachers' theories of intelligence are important in maintaining and priming students' intelligence beliefs, as intelligence beliefs are antecedents to student motivation (Yeager & Dweck, 2017). Therefore, it is important to understand teachers' intelligence beliefs and their enactment of intelligence feedback in-situ.

Research in teacher beliefs suggests both teacher belief and practice are nuanced with wider contextual considerations (e.g., influence of school policy) (Fives & Buehl, 2014), and that context plays a large role in guiding teacher feedback. Further investigation into the intelligence belief-intelligence feedback relationship of teachers may assist with our understanding of the manifestation of intelligence beliefs in intelligence feedback. As few studies have investigated the role of teacher intelligence beliefs and their intelligence feedback (Rissanen et al., 2018a; 2019), this Doctoral research aimed to provide further insight into the intelligence belief-intelligence feedback relationship.

Data were collected through a mixed-methods design with ten Secondary school teachers in England. The data collection procedure consisted of an implicit theory of intelligence self-report (De Castella, 2015), video recorded lesson observation (coding teacher intelligence feedback) and a semi-structured interview, including stimulated-recall. Teachers were required to discuss their intelligence feedback in interviews, where segments of video observations were used for reflection. This methodological approach was considered a strength of the research, given that teachers could provide attributions to their own intelligence feedback, which was corroborated with self-reports. Data were analysed using a two phase approach, with phase one answering the three research questions associated with the Doctoral study, through thematic analysis. Phase two analysis was undertaken using an abbreviated grounded theory approach, in order to utilise the data, which went beyond the research questions and gain further insight into participant intelligence beliefs, in-situ experiences and feedback attributions.

Findings indicate that the intelligence belief-intelligence feedback relationship of teachers was influenced by other teacher beliefs about students (e.g., social background and behaviour) and context (e.g., school, school policy and exam pressures). In addition, the self-reported intelligence beliefs of teachers within this Doctoral study did not always align with verbalised intelligence beliefs and intelligence feedback. Thus, intelligence beliefs were not always salient to teacher intelligence practice, as previously hypothesised (Haimovitz & Dweck, 2017). This Doctoral study identified beliefs which are stronger influences on intelligence feedback, such as school context, and provides a unique contribution to the literature in highlighting the limited role of teachers' theories of intelligence on intelligence feedback in naturalist scenarios. Given the complexities of the belief-practice relationship, as identified by others (e.g., Buehl & Beck, 2014; Rissanen et al., 2018a; 2019), a hypothesised model of the intelligence belief-intelligence feedback relationship is also presented, as part of the findings, which is an additional contribution to the literature of teachers' theories of intelligence.

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Key Terms and Definitions

CPD	Continued Professional Development
Belief	An individual's concept/theory
DfE	Department for Education
Ecology	An individual's context
EEF	Education Endowment Foundation
Entity Belief	Intelligence is fixed and innate
FM	Fixed Mindset
GCSE	General Certification of Secondary Education
GM	Growth Mindset
Incremental Belief	Intelligence can be developed and is malleable
INSET	In Service Education Training
Intelligence Feedback	A form of teacher practice regarding students learning events
AGT	Abbreviated grounded theory
National Curriculum	Mandatory curriculum for schools
NCT	National Curriculum Tests
OfSted	Office for Standards in Education
P	Participant
RQ	Research Question
Secondary School	Mandatory education for pupils ages 11 - 16
SES	Socio-Economic Status
STR	Stimulated Recall
TA	Thematic Analysis
Theory of Intelligence	An individual's belief about intelligence

Chapter 1

Introduction and Research Questions

1.1 Introduction

This study investigates the relationship of English secondary school teachers' implicit theories of intelligence and their intelligence feedback, in classroom settings. Data were collected using a mixed-methods approach, consisting of a pre-validated questionnaire (Dweck, 1999), one recorded and coded lesson observation of teacher practice in-situ and semi-structured interviews with teachers. Chapter 1 places the research in the larger fields of psychology and education literature and presents the research questions of the study. An overview of methods, thesis chapter structure and a summary of the research setting is also provided in order to contextualise the work.

Implicit Theories of Intelligence

Intelligence beliefs within this Doctoral study are framed and investigated through the lens of Carol Dweck's (1999) implicit self-theories of intelligence. According to implicit theories of intelligence, individuals believe intelligence is either fixed, with one having a set amount (an entity theory of intelligence) or intelligence can be developed and grown over time (an incremental theory of intelligence) (Dweck, 1999). Research indicates individuals can also hold a mixed belief, where there is no strong endorsement of either entity or incremental (Dweck & Molden, 2007). Consequently, implicit theories of intelligence are held on a continuum. Individuals holding a mixed belief may report bias toward the opposing ends of the continuum (e.g., self-report mixed theory of intelligence, stronger bias toward entity).

Dweck (1999) reports implicit theories of intelligence are important antecedents to an individuals' behaviour in educational scenarios, including learner responses to failure and self-regulation. Others have also identified that implicit beliefs of intelligence may contribute to some elements of teachers' intelligence feedback (e.g., praise, motivational language and degree of challenge) (Fraeyman, 2020; Rissanen, Kuusisto, Hanhimäki, & Tirri, 2018a; Rissanen, Kuusisto, Tuominen, & Tirri, 2019). Teacher intelligence feedback is important, as research documents intelligence feedback can influence learner outcomes (e.g., student motivation) through the socialisation of incremental or entity intelligence feedback (ibid) (see Section 2.2.1, 3.10 and 3.11). Intelligence feedback which socialises an incremental theory of intelligence is associated with the process of learning, while entity intelligence feedback corresponds to feedback about the person in learning scenarios (Kamins & Dweck, 1998). However, to date, research which documents implicit theories of intelligence in teacher intelligence feedback in classrooms is limited. Studying the role of teacher intelligence beliefs on practice (e.g., intelligence feedback) will provide additional insight into teacher feedback to learners. This is important, as teacher feedback is a key aspect of learner motivation and academic development (Anderman & Gray, 2017; Ruiz-Primo & Brookhart, 2018). The current Doctoral research therefore aimed to contribute to the extant literature on implicit theories of intelligence and the teacher belief-practice (e.g., intelligence belief-intelligence feedback) relationship, in order to better understand teacher decision making, attributions and feedback.

Terminology

Following the publication of Dweck's (2006) book "Mindset: How You Can Fulfil Your Potential", educators became familiar with the concepts of 'growth mindset' (incremental) or 'fixed mindset' (entity); the lay-terms associated with implicit theories of intelligence. Summarising research across 40 years, Dweck (2006) provided accessible and simplified information for practitioners who may not understand the nuances of the terms more commonly found in the academic literature. Dweck (2006) aimed to provide simplicity of terms in order to bridge the gap between education and research. Since publication, growth mindset has also become a marketable concept, with school buy-in opportunities; to create a culture of 'growth mindset' (Dweck, 2020) (see Section 2.2). Terms of fixed (entity) and growth (incremental) mindsets are now present across various research studies, with published work using both terms (Blackwell, 2007; Dupeyrat & Mariné, 2005; Dweck, 1999; Dweck, 2015; Haimovitz, Wormington, & Corpus, 2011; Schunk, 1995). This thesis references the originally proposed terms of incremental, entity and mixed theories of intelligence (Dweck & Molden, 2007; Dweck & Bempechat, 1983), however makes reference to fixed and growth mindset, where cited in a published study.

1.1.1 Study Contextualisation and Background

In order to provide study contextualisation and background, this section outlines the literature which underpins implicit theories of intelligence and teacher beliefs. Given that implicit theories of intelligence arose through the study of learner intelligence beliefs and their motivational outcomes (Dweck & Bempechat, 1983), Section 1.1 highlights literature associated with learners' beliefs and behaviours, which underpinned the study of teachers' intelligence belief.

Learner Beliefs

Research suggests that the strong beliefs held by learners, whether entity or incremental, have implications for various motivations and behaviours. For example, ascribing to strong intelligence beliefs (e.g., incremental/entity) is documented as affecting learners effort in response to challenge (Ying-yi, Dweck, Chi-yue, Lin, & Wan, 1999), achievement goals (Dweck, Chiu, & Hong, 1995), attributions to failure, academic performance and self-efficacious beliefs (Blackwell, 2007; Dweck & Elliot, 2007). Furthermore, the intelligence theories endorsed by learners may act as a causal pathway in determining academic achievement and motivation.

Early research surrounding implicit intelligence theories indicates that there are two distinct behavioural patterns associated with the opposing intelligence theories; related to evaluations of ability (Dweck & Bempechat, 1983). Entity theorists are more likely to display a helpless response to failure, due to their belief that intelligence is fixed, and therefore attributing personal failures to external sources (e.g., not given enough time). Furthermore, entity believers adopt performance goals, where learners are concerned with displaying their competence relative to others (Dweck & Elliott, 1988; Dweck & Leggett, 1988). In contrast, incremental theorists attempt task mastery (e.g., competence improvement for self or task) through additional effort, new strategies to overcome challenge and are concerned with the development of intelligence. Therefore, failures for incremental theorists are attributed to a lack of effort, persistence or strategy used. In summary, Dweck & Bempechat (1983) proposed that the implicit theory of intelligence a learner endorses impacts academic outcomes, as a consequence of self-regulatory processes.

Building on the original concept of implicit theories of intelligence, as first proposed by Dweck & Bempechat (ibid), studies in the United States have evidenced higher grades for learners endorsing an incremental belief, comparative to entity theorists (Aronson, Fried, & Good, 2002; Blackwell, 2007; Claro, Paunesku, & Dweck, 2016). Given the evidence, where incremental theorists are associated with higher academic outcomes, multiple studies have investigated the application of interventions to alter learner's entity intelligence beliefs to incremental, in an attempt to raise academic achievement. Findings from some studies have indicated higher academic achievement following interventions (e.g., increased grade point averages) (Blackwell, 2007; Paunesku et al., 2015; Yeager et al., 2019) (see Section 2.2 for discussion).

Teacher Beliefs, Socialisation and Theories of Intelligence

In teacher practice, as previously outlined, there are two contrasting types of intelligence feedback. Entity feedback is maladaptive to student achievement, whilst incremental feedback is conductive to student achievement (Haimovitz & Dweck, 2017). Some studies have also aligned teacher intelligence feedback with teacher intelligence belief (Gunderson et al., 2013; Gutshall, 2013; Lin-Siegler, Dweck, & Cohen, 2016; Rattan, Good, & Dweck, 2012). For instance, teachers who self-report entity theories praise for innate intelligence (e.g., person-praise). Entity intelligence feedback can socialise maladaptive learner behaviour and entity belief reinforcement, through emphasis on the innate intelligence of an individual (e.g., “you are clever”). While incremental intelligence feedback accentuates the process (e.g., “you have worked hard”), which can increase motivation and learner incremental belief adoption. Incremental intelligence feedback indicates intelligence is a product of effort and therefore malleable (Gunderson et al., 2013; Gutshall, 2013; Lin-Siegler, Dweck, & Cohen, 2016; Rattan, Good, & Dweck, 2012). Therefore, intelligence beliefs of teachers can affect intelligence feedback, which in turn affects student beliefs and outcomes.

In Haimovitz & Dweck’s (2017) most recent hypothesis, teacher intelligence beliefs are socialised to students as a result of teacher implicit theory combined with teacher motivational beliefs about students. For example, a teacher endorses incremental belief, but believes students are motivated by self-efficacy praise (e.g., you are clever). Therefore, the teacher provides entity feedback praise, as their self-efficacy belief may be stronger or more central (see Section 2.3 for information about belief strength and centrality). However, Haimovitz and Dweck (2017) do not have any evidence at present to underpin their hypothesis, therefore the theory is untested. Others suggest there is a more complex relationship between intelligence beliefs and teacher intelligence feedback (e.g., intelligence belief and teacher instruction moderated by cultural beliefs) (Rissanen et al., 2018a) (see Section 2.2).

1.1.2 Contextual Factors

In recognition of the complex nature of teacher beliefs and intelligence feedback practices, this Doctoral study explores intelligence beliefs as framed by teachers’ wider ecology; such as school environment and broader English educational context (see Section 2.8 for English Educational context). In accordance with the ecology model presented by Buehl and Beck

(2014) (see Section 2.6), teacher ecology encompasses teacher context and beliefs as working in parallel, thus cannot be separated. Therefore, Buehl and Beck's (2014) ecological model proposes teacher beliefs and practices are enacted and guided in accordance with the unique situation and context of the individual.

More specifically, Buehl and Beck's (2014) ecological model identifies internal and external hindrances and supports to teachers within their roles; affecting various aspects of practice (e.g., application of constructivist teaching, teacher feedback, classroom management, and type classroom goal structure) and interactions with students (for full review of teacher practices see Buehl & Beck, 2014). The teacher is placed at the centre of the model, where various internal (e.g., other beliefs of the teacher) and external (e.g., school, local and national context of the teacher) levels work in conjunction in order to shape behaviour (Bronfenbrenner, 2005; Buehl & Beck, 2014).

Within Buehl and Beck's (2014) teacher ecology, it is proposed that teacher's development is shaped by the interaction of multiple systems, such as culture, family, environment and biological factors, creating a subjective environment. Therefore, the subjective environment of the teacher is proposed to affect their practice (ibid.). Beliefs and practice are also described as existing within the broad multi-levelled context of the ecology, which influence various internal (e.g., experience and knowledge) and external factors (e.g., educational policy, school ethos and culture) (Buehl & Beck, 2014). The purpose of utilising Buehl and Beck's (2014) model to underpin the current Doctoral study was to assist with the investigation of the intelligence belief-practice relationship of teachers. While Dweck (1999) has previously noted that environment (e.g., culture, student population and school ethos) may affect intelligence beliefs and behaviours, it is yet to be fully explored. Accounting for the role of school context (e.g., policy, teacher practice, ethos, peer norms etc.) in studying theories of intelligence was reiterated in newer work by Dweck and colleagues (Dweck & Yeager, 2019), although there is limited study of context and theory of intelligence. More specifically, a gap in the literature exists, which investigates context of teacher intelligence beliefs and their intelligence feedback (e.g., practice). Therefore, this Doctoral study aims to provide new insights into the potential role of teacher context on the enactment of intelligence beliefs and teacher use of intelligence feedback.

1.1.3 Feedback in Teaching and Learning

Given that the current Doctoral thesis explores teacher intelligence belief and teacher intelligence feedback, this section outlines the use of feedback in teaching and learning. Feedback is often described as one of the most effective means to support students' learning (Hattie & Timperley, 2007). Hattie and Timperley (2007) identify that feedback, in teaching, is information provided by teachers, regarding aspects of students' performance or understanding. It can be in response to set tasks, achievement or the process of learning, and therefore bridges the gap between "what is understood and what is aimed to be understood" (ibid, p. 82). Feedback is visible across various instructional aspects of pedagogy, such as teacher modelling or demonstrating. Types of feedback can include written and oral comments in response to work, or any verbal exchange which may happen between teachers and learners (e.g., discussion, dialogue or conversation); therefore feedback is integral across the teaching and learning process (Mottet, 2008; Ruiz-Primo & Brookhart, 2018).

Valence is an important aspect of feedback, as valence in feedback relates to the positive or negative messages implied by teacher feedback. Valence can be implied or direct, and is an indicator of behaviour or performance (Mottet, 2008). For instance, when linking intelligence through valenced intelligence feedback, "well done" implies a student is achieving and work is satisfactory, therefore may insinuate intelligence. While "that's not good" is negative and critical of student work, thus may imply low intelligence. However, equally, it could also be neutral, with no suggestive valenced tone. Furthermore, "okay" may be positive or negative feedback valence – dependent on the suggestive tone of the teacher (positive or negative). Therefore, valence feedback is task and situational dependant, as well as varying across teachers and dependant on student interpretation of feedback (e.g., if not explicitly valenced). Consequently, valence in feedback may be an integral element of feedback practices of teachers, particularly if removed from context. For example, if a teacher states "okay" to one student positively valanced, while negatively valanced to another individual.

Furthermore, feedback can be dependent on teacher degree of noting, identified as the aspects of learning teacher decides to respond to (Sherin, Jacobs, & Philipp, 2011). As teachers' can choose to ignore or respond to events, making judgements on learning and progress, noting can affect how often feedback is provided (Ruiz-Primo, 2019). The process of deciding to respond may lie in teacher experience of pupils, the task and noting;

encompassing a number of internal and external factors – as discussed earlier (see Section 1.1.2).

Considering feedback is a key factor for learning success, whilst also a core element of assessment (Black & Wiliam, 2009), although not every type of feedback is beneficial for learning (Hattie & Timperley, 2007). For instance, feedback which does not include information which students can use to progress would not assist learner development, or feedback which is entangled with teacher belief about pupil learning. In such a scenario, a teacher may not believe a low-set class is capable of comprehending higher order thinking, therefore, does not provide intelligence feedback to challenge students (see Section 2.3.2) (Fives & Buehl, 2012; Fives & Gill, 2014a). Thus, it is important to uncover what types of feedback, and teacher beliefs, are beneficial for student learning (Ruiz-Primo & Brookhart, 2018). Ruiz-Primo (2019) suggests that the examination of teacher feedback across contexts can assist our understanding of the factors that may affect teacher feedback. While also identifying feedback practices which may be beneficial or detrimental to learner knowledge development (see Section 3.10).

On the whole, when analysing feedback, researchers therefore need to consider the broader classroom context and situation (e.g., task, individual and relationships); as context may affect interactions between teacher and student feedback (ibid) (see Section 2.5). Given that this thesis is underpinned by implicit theories of intelligence, literature pertaining to teacher intelligence beliefs was used to identify teacher feedback practices. Details of teacher intelligence feedback practices are discussed in Sections 2.3, 3.10 and 3.11.

1.1.4 Limitations of the Extant Literature

When exploring previous research, there are various limitations in the areas of teacher intelligence beliefs and intelligence feedback. Therefore, an overview of previous limitations are provided in this Section (1.1.4). More details of limitations are discussed in Chapter 2, in relation to specific studies.

Whilst there are multiple studies which have investigated the role of students' implicit intelligence beliefs on student behaviour (for review of work see Green, 2014), limited research explores the nature and role of teachers' implicit intelligence beliefs and intelligence feedback. Furthermore, there is a lack of qualitative research to provide depth of understanding (Section 3.4 and 3.7), as well as few studies which have collected data in-situ (e.g., day-to-day teaching). Research is predominately focused on quantitative methods, which have failed to address contextual factors, despite some suggestion that context contributes to teacher intelligence belief enactment (Buehl & Beck, 2014; Haimovitz & Dweck, 2017). To address these concerns, this Doctoral study collected data from real-life teacher scenarios, and used qualitative methods, to capture intelligence feedback from teachers and assess the role of intelligence beliefs on intelligence feedback. The aim of the Doctoral research was to assist with understanding contextual factors which may affect teacher enactment of intelligence belief and use of intelligence feedback (Dweck, 2017; Dweck, Elliot, & Yeager, 2017; Gunderson et al., 2013; Lin-Siegler et al., 2016; Snyder, Malin, Dent, & Linnenbrink-Garcia, 2014).

Few studies have investigated teachers' implicit theories in-situ; for example Rissanen et al. (2018a; 2019), Sun (2015) and Song (2018) (see 2.2.2 for a review of this literature). All of the aforementioned studies were qualitative, where data was collected through a combination of observations, field notes, interviews and questionnaires. However, all authors recommended future research is conducted, given the small amount of qualitative literature in the domain of theories of intelligence (ibid). It is also important to note that all three studies were outside of England, in the USA and Finland. Similarly, the majority of research, which studies implicit theories has taken place in the USA, where the theory originated through the work of Carol Dweck and colleagues (Dweck & Bempechat, 1983; Dweck & Elliott, 1988; Dweck & Leggett, 1988). Therefore, this Doctoral thesis addresses a gap in research by presenting data from teachers in England, which is culturally and educationally different from other studies (e.g., educational policy and exam specification).

Furthermore, research indicates it is difficult to use experimental data (e.g., teachers responding to vignettes and questionnaires) to predict teachers' real-life behaviour; as individual's responses may differ between deliberated responses and in-situ behaviour (Buehl & Beck, 2014). Some of the existing research studying teacher's beliefs is "impractical or not tested in ways that can be meaningfully scaled up" (Paunesku, 2016, p. 785). For example, research which is undertaken in experimental conditions and removed from context, or where the procedure includes responses to hypothetical scenarios in teaching (Rattan et al., 2012). Recognising a lack of naturalistic research in the extant literature, this thesis explored the intelligence beliefs and intelligence feedback of teachers' through mixed-methods (questionnaires, observations and interviews).

Surveying the literature, there are various studies of implicit beliefs, which have focused on students across the last 40 years. More recent research includes investigating the potential of interventions to raise student achievement through teacher and students intelligence belief change (Lin-Siegler et al., 2016; Paunesku et al., 2015; Rienzo, Rolfe, & Wilkinson, 2015; Yeager & Dweck, 2012). While there are multiple studies which underpin the original theory and have contributed to the development of the theory in practice (e.g., application in schools), it is important to note that this Doctoral thesis was concerned with the study of teachers in situ and their intelligence beliefs. This thesis was not concerned with belief change or student beliefs. However, literature is reference for the purposes of identifying key developments which influenced the development of the current thesis.

1.2 Research questions

Reviewing limitations (see Section 1.1.3) and drawing together the initial ideas presented in this introduction (Chapter 1), the research questions surrounding this work were as follows:

> *Research Question 1. (RQ1)* Do teachers' theories of intelligence correspond with their intelligence feedback; if so in what ways?
>
> *Research Question 2. (RQ2)* What types of intelligence feedback do teachers' believe they socialise to students?
>
> *Research Question 3. (RQ3)* What are teachers' beliefs about internal and external factors in relation to their intelligence feedback?

1.3 Thesis Overview

In order to investigate and answer the research questions (Section 1.2.), the thesis is divided into 7 chapters, which evidence and document key theories, methods and findings. Chapter 2 provides the reader with a review of literature in the fields of implicit theories of intelligence, teacher beliefs, intelligence feedback, teacher ecology and the educational context in England. The literature in Chapter 2 forms the background of the Doctoral research in order to provide a foundation of theory and discussion, in Chapters 5 and 6. Chapter 3 covers the methodology included in the thesis, exploring the researcher's stance and drawing upon methodologies. Sample size and recruitment is presented, as well as ethical and associated considerations (e.g., access to participants, confidentiality of data, and a summary of the pilot study). Chapter 4 covers the presentation of individual data, using Braun and Clarkes (2006) six phase analytical process. Chapter 5 discusses the findings in relation to both the RQ's and the literature presented in Chapter 2, drawing upon previous research to underpin findings. Chapter 6 presents a hypothesised theory in response to the findings, from a second phase of analysing using AGT. Finally, Chapter 7 concludes the thesis, linking back to the RQ's, revisiting findings, research implications and providing further recommendations. An appendix also accompanies this document, which contributes additional supporting materials for reference throughout.

1.4 Chapter Summary

This chapter aimed to provide the reader with an overview of the key areas included in the Doctoral thesis; notably implicit theories of intelligence, teacher feedback, context and beliefs. Some limitations across current literature have been identified, as well as an outline of key studies. In the following Chapter (2) more detail is provided, expanding on the initial ideas presented in Chapter 1.

Chapter 2

Literature Review

2.1 Introduction

The literature review expands upon the key theories of the thesis, across the domains of psychology and education. Extant literature of Chapter 2 is used to underpin this Doctoral thesis, providing a foundation for research questions (see Section 1.2) proposed and arguments for the uniqueness of this study.

2.2 Implicit Theories of Intelligence in Wider Educational Contexts

This Section presents implicit theories of intelligence in the literature, covering the construct, socialisation and contextualisation of the theory. Research across various levels of education is included, for example adult learners in higher education (aged 18+), primary learners (ages 5 – 11) and secondary learners (ages 11 – 16). Including a selection of studies from across educational levels provides a detailed theoretical background and key developments across implicit theories of intelligence, therefore underpinning the research within this Doctoral study.

Originating in the work of Carol Dweck, implicit theories of intelligence are an individual's belief about the nature of intelligence. Intelligence beliefs can be fixed and innate (e.g., entity theory of intelligence), malleable and developed (e.g., incremental theory of intelligence) or a mixture of both (e.g., mixed belief) (Blackwell, 2007; Dweck, 1999; Dweck & Bempechat, 1983; Dweck et al., 2017; Dweck & Leggett, 1988). A self-report measure, of implicit beliefs of intelligence, is most commonly utilised across studies to measure an individual's intelligence belief (see Dweck, 1999).

Definition & Terminology – Jingle-Jangle

Surveying literature, which investigates Dweck's (1999) implicit theories of intelligence (discussed in 2.2 and 2.2), terms used to describe beliefs of intelligence are inconsistent. For example, mindsets, self-beliefs, lay theories, naïve theories and implicit theories are widely applied in the literature, when citing Dweck's work. Inconsistent use of terms is a conceptual issue, as each term encompasses differing elements (Lüftenegger & Chen, 2017). Arguably, inconsistent use of terms is referred to as the 'jingle-jangle' fallacy (Marsh, 1994). The jingle fallacy refers to assuming scales with the same names, measure the same construct (e.g., using the same term for different concepts). While the jangle fallacy scales assumes that scales with different names, measure different constructs (e.g., using different terms for the same concept). For instance, when referring to an implicit theory, *theory* is defined as the abstract understanding an individual holds, while *implicit* indicates individuals' theories are rarely made explicit (ibid). Therefore, an individual's implicit theory creates an intuitive meaning system for predicting meaning and judgments in an individual's world; which they are unaware of (Yeager & Dweck, 2012). Mindsets, rather, describe a particular way of thinking or an attitude/opinion toward something. Thus, failing to address the same basic concepts as implicit theories, which are theory, intuition and lack of awareness (Lüftenegger & Chen, 2017).

Furthermore, some terms are more specific to domains, for example "mindsets" are common in educational research, while "lay" and "naïve" theories are common in social psychology (ibid). Others have also used terms interchangeably across the same study or research, causing further problems with concepts (Burnette, O'Boyle, Vanepps, Pollack, & Finkel, 2012) (e.g., mindset and implicit theory). On the whole, it is agreed that the common understanding across an individual's concept (e.g., traits, self-theories, places, people etc.) spans from malleable to innate, across a continuum. Therefore, while the foundation of all terms are the same, nuances exist between terms. Given the issue of lack of clarity, it is important to provide a clear definition of theories of intelligence and present researcher understanding. This both informs the reader and highlights which domain the research aligns with.

It is appreciated that the term "growth mindset" may be more appealing and is more accessible to schools and learners, bridging the gap between research and practice. However, in an academic setting and across research, "mindsets" are too simplistic in their definition, to uncover and define the broader implications of theories of intelligence on motivation (e.g., behavioural patterns and socialisation processes) (Lüftenegger & Chen, 2017). Particularly as in research, theories of intelligence are interwoven with other motivational concepts and frameworks, such as goal adoption and behavioural patterns (Dweck, 1999), which may lie outside of educationalists priorities. Terms common to the cited study will be used for reference in discussing literature, however, it is identified that lack of clarity with terms is a wider issue across research.

Achievement Goals and Implicit Theories of Intelligence

Implicit theories of intelligence are proposed as a motivational model, with achievement goals as a central construct. Within the motivational model, implicit theories of intelligence drive achievement goals in learning scenarios (Dweck, Chi-yue, & Ying-yi, 1995). Dweck (1999) describes achievement goals as the types of goals learners choose to adopt in failure or success scenarios. Other definitions of achievement goals exist in the literature (Elliot & Murayama, 2008; Elliot, Murayama, Kobeisy, & Lichtenfeld, 2015; Elliot, Murayama, & Pekrun, 2011), however Dweck's definitions are followed across this Doctoral thesis. Dichotomously, achievement goals are either learning (also referred to as mastery; Elliot, 2005), where individuals aim to develop skills and competence for mastery of tasks; or performance, where individuals are concerned with achievement relative to others (Dweck & Elliott, 1988).

Research indicates entity theorists are more likely to adopt performance goals, while incremental theorists are more likely to adopt learning goals (Dweck & Elliott, 1988). Therefore, implicit theories cause individuals to orient toward academic goal choice (ibid). It is the individual's theory of intelligence, determining goal choice, and outcome of related tasks which affects academic motivation and behaviour (Dweck, Chi-yue, et al., 1995; Dweck, Elliott & Yeager, 2017). For example, a student holding an entity theory adopts a performance goal. The entity student fails to demonstrate a high level of competence, comparative to their peers, which is central to their belief of intelligence and goal of achievement. As they believe their intelligence is fixed, their response is helpless, as effort would not change their innate intelligence. In this scenario, persistence serves no purpose as they are only capable of achieving a predetermined amount (Dweck & Elliott, 1988). Consequently, Dweck (1999) identified that implicit theories of intelligence are important in learner scenarios, as intelligence beliefs can predict and assist our understanding of learner responses in academic scenarios.

Across research, implicit beliefs of intelligence have also been correlated with various other behaviours in learning scenarios and academic outcomes (e.g., incremental theorists achieving better academic results comparative to entity theorists) (Dweck, 1999; Dweck, Elliott & Yeager, 2017; Shim, Cho, & Cassady, 2013). When reviewing literature of student's implicit theories of intelligence and failure outcomes in achievement scenarios, Dweck et al. (1995) found entity theorists related failure to fixed traits (e.g., 'I am not clever'). Whilst incremental theorist's related failure to malleable behavioural mediators of outcomes (e.g., 'I did not put in the effort'). Dweck and colleagues (2017) consistently report learners benefit from endorsing an incremental belief. Particularly as incremental theorists display persistence when faced with challenge, therefore may attain higher academic attainment, comparable to entity theorists facing the same level of challenge (ibid).

Self-Theories, Defining Intelligence and Implicit Theories of Intelligence

Implicit theories of intelligence are categorised as a self-theory, with intelligence identified as an aspect of an individual's "personal quality" (Dweck & Molden, 2007, p. 123). Furthermore, implicit theories of intelligence are also commonly cited as a belief (Dweck, 1999). Thus the terms "theories of intelligence" and "beliefs of intelligence" refer to the same concept throughout this thesis.

Beliefs of intelligence are traditionally measured using a self-report questionnaire (see Section 3.8). Research on self-theories extends beyond intelligence, to other personal qualities, such as personality, morality and will-power (Dweck, 1999). For the purposes of this study, other implicit beliefs are not discussed in detail, given that the current research focuses on theories of intelligence.

In accordance with theory of intelligence, intelligence is defined by the individual and the self, as opposed to theoretically defined (Dweck, 1999). This causes debate regarding the generalisation of intelligence and intelligence beliefs (Green, 2013; Lüftenegger & Chen, 2017), as intelligence is simply identified as socially agreeable construct within Dweck's (1990) logic. However, wider research on intelligence as a construct indicates an individual's concept of intelligence is complex (see Section 2.9 for discussion). Although the items in Dweck's intelligence theory self-report indicate reliable measurement of the construct (Cronbach's α = .94 to .98; Dweck, Chiu & Hong, 1995), the self-report does not account for variation in individuals' concepts of intelligence. For instance, one person could reliably respond with the understanding that intelligence is the ability to acquire and apply knowledge and skills, while another person may understand intelligence as the ability to adapt oneself adequately to relatively new situations in life. Despite individual differences, responses are consistent and the internal reliability is high (for a review of intelligence definitions across the literature, see Legg & Hutter, 2007). Researchers have therefore noted that interpretation of intelligence is a different matter to construct measure, as individuals interpret their own intelligence based on their understanding of how intelligence is defined (Green, 2013). Therefore, the conceptualisation of intelligence is currently nuanced in theories of intelligence (see Section 2.9).

While there appears to be an exclusion of a theoretical definition of intelligence, Dweck & Mueller (1999), sought to investigate college students' definitions of intelligence in relation to their own theory of intelligence. It is not possible to provide details of the study, as the work is unpublished; however, Dweck cites results in her self-theories book (1999). Overall, the evidence indicates that incremental theorists include effort and motivation as integral aspects of defining their own intelligence. Entity theorists, rather, include inherent capacity or potential (e.g., inborn and least amount of effort) (Dweck, 1999). Although there are similarities in definitions across individuals ascribing to each theory, in accordance with Dweck and Muller's (ibid) findings, intelligence is not explicitly defined in the self-theory approach. Therefore, in-depth discussion of intelligence as a construct was excluded from this thesis. Rather, individuals' conceptualisations were addressed within the study of this thesis. For instance, participants in the present Doctoral study were asked to define intelligence for the purpose of research, to explore common themes among teacher's beliefs about their perception of intelligence (see Section 3).

Social Cognitive Underpinning and Implicit Theories of Intelligence

Further embedded within implicit theories of intelligence, Dweck (1999) proposes that implicit theories of intelligence are built upon social cognitive and personal construct theories (e.g., Kelly, 1955). More specifically, to better understand individuals' behaviour in relation to their intelligence beliefs. Social cognitive theories are concerned with how social information is processed and affects behaviour, as well as how beliefs, values and goals create a meaning system for individuals (Bandura, 1986). To acknowledge the underpinnings of theories of intelligence, a summary of social cognitive theories and related examples in implicit theories of intelligence literature is outlined below. The main social cognitive theories Dweck (1999) identifies and links to theories of intelligence are:

- **Triadic Reciprocal Determination** – Triadic Reciprocal Determination (TRD) accounts for the influences of environment (e.g., other people and events), which affect beliefs and behaviours of individuals (Bandura, 1986). The TRD model provides three areas, which reciprocally interact: behaviour (e.g., actions and decisions), environment (e.g., external spaces, laws, objects) and person (e.g., internal competencies, cognitive, emotional and physical). Across her work, Dweck (1999) suggests that implicit beliefs of intelligence are shaped by context (e.g., external factor/influence). TDR implicit intelligence beliefs have been demonstrated in some research (Gunderson et al., 2013). For instance, in the parental use of praise. Parents praise a child, (e.g., external to the child/environment) which influences children’s implicit theories of intelligence (e.g., internal competency/person) and the child’s subsequent behaviour (e.g., actions following praise type) (Gunderson et al., 2013). Therefore, in theories of intelligence, external intelligence feedback from parents is an example of the interactions of TDR.

- **Achievement Goals** – As discussed earlier in Section 2.2, achievement goals are related to the types of goals individuals choose to adopt in academic scenarios (Ames & Archer, 1988). These are performance-goals, concerned with demonstrating competence, relative to peers. While those adopting mastery-goals (or learning – used interchangeably by Dweck, 1999) are concerned with increasing competence and skills. Achievement goals underpin the early work of Dweck and colleagues, which indicated entity theorists, adopt performance goals, whilst incremental theorists adopt mastery goals (Dweck & Bempechat, 1983; Dweck & Elliott, 1988).
- **Attribution Theory** – Attribution theory is concerned with the causal judgments of individuals in response to success and failure (Graham, 1996). For instance, individuals’ may blame errors on external factors out of their control (e.g., associated with entity theorists - “I am not clever”) or internal factors related to the self (e.g., associated with incremental theorists - “I didn’t try hard enough”). Attributions for success and failure are presented across theories of intelligence, where entity theorists attribute innate intelligence external to their control, while incremental theorists attribute malleable factors under their control (Diener & Dweck, 1978; Dweck, Chiu, et al., 1995).
- **Self-efficacy** – Self-efficacy is defined as the degree to which an individual feels competent in their abilities to execute a task (Bandura, 1994). An individual’s self-efficacy will therefore affect how individuals approach a task. Linked to implicit theories of intelligence, early research by Dweck and Bempechat (1983) suggested that individuals’ perception of their competence on a task can affect their response to failure; particularly with entity theorists. For instance, an entity theorist is most likely to adopt performance goals, with high self-efficacy they are concerned with obtaining

a favourable competence judgement and demonstrate a mastery-oriented achievement pattern. While low self-efficacy results in an entity theorist avoiding negative competence judgements and respond helplessly if failing (ibid) (see Figure 1).

Meaning System Approach

In accordance with social-cognitive underpinnings (e.g., TDR, achievement goals, attribution theory and self-efficacy), implicit theories create larger meaning and definition of the self; termed by Dweck and colleagues as a 'meaning system approach' (see Table 2.1) (Dweck, Chi-yue, et al., 1995; Dweck, Chiu, et al., 1995; Dweck & Leggett, 1988). Within a meaning system approach, implicit theories of intelligence shape various behaviours (e.g., goals and attributions).

Table 2.1 Summarising Theory of Intelligence Meaning Systems in Academic Scenarios

Incremental Theorists	***Entity Theorists***
Learning/Mastery goals	Performance goals
Increased motivation - Persistence when failing (Task mastery)	Decrease in motivation - Helpless response when failing
Increase effort to attain goals	Relies on natural ability
Higher academic results in face of challenge	Fast completion of tasks reaffirms innate intelligence

In a meaning systems approach, academic behaviour (e.g., effort, response to failure and strategy employment) is regulated by implicit theory of intelligence (Dweck, 1999). Notably as it is implicit theory adoption which causes learners to opt for specific achievement goals, and resultant behaviours (ibid). Dweck, Chiu and Hong (1995) highlight that because many behaviours are associated with an individual's implicit theory of intelligence, intelligence beliefs are a core assumption.

Core Assumptions – Theories of Intelligence

A core assumption in the belief system connects to a larger framework of beliefs and behaviours (e.g., defines an individual's reality and attributes meaning to events). Research indicates implicit beliefs of intelligence play a central and causal role in outcomes; such as students' academic achievement (Dweck, Chiu, et al., 1995), teacher work engagement (Zeng, Chen, Yan Cheung, & Peng, 2019) and attributions for failure (Ying-yi et al., 1999). Meta-analysis of research from 1998 – 2017, further suggests that implicit theories of intelligence act as both casual roles, for example on student academic achievement, and as a moderator role (e.g. incremental theories counter negative effects of low socio-economic status on achievement) (Zhang, Kuusisto, & Tirri, 2017). Dweck (1999) has argued that the implicit beliefs individuals hold are stable over time if left un-probed, given that they are core assumptions which are difficult to alter (see Section 2.6) (Rokeach, 1969). Although, research also indicates that with targeted tasks, interventions can alter and prime intelligence beliefs (Blackwell, 2007). Therefore, presenting some conflict across research, as intelligence beliefs are proposed as both a core belief and changeable (see Section 2.9). Target belief change interventions are discussed further in the sections that follow.

Measurement of Intelligence Belief

To measure implicit beliefs of intelligence, a four-item self-report is used, with Likert scale responses ranging from 1 – 6 (Dweck, 1999; Dweck, Chiu, et al., 1995) (α = .94). Individuals endorsing high incremental theories score 1 – 2, while individuals ascribing towards an entity theory score 5 – 6. Scores between 2.1 and 4.9 are 'mixed believers' (Claro et al., 2016). Dweck and Molden (2007) report around 40% of individuals hold entity beliefs and 40% hold incremental beliefs; the remaining 20% is undecided or mixed. Questionnaire data is not provided in the work of Dweck and Molden (2007), to assess the sample weightings reported above. Importantly, Dweck, Chiu and Hong (1995) note, that individuals ascribing to a mixed theory are excluded from samples, due to an inability to correlate strong belief with other variables (e.g., student achievement). Strong and bias beliefs are therefore generally only included in results, which may cause limitations in findings. Notably, as research suggests beliefs can be temporarily primed, dependant on situational factors (e.g., external environment), the implications of which are discussed below.

Situational Factors/External Context

When proposing the theory, Dweck & Bempechat (1983) acknowledged that implicit theories of intelligence may be temporarily altered as a result of situational factors (e.g., external environment), with learners applying different theories across academic situations. In a high-stakes exam for instance, an individual may adopt an entity theory and performance goals, if there is an emphasis for reward for highest attainment comparative to others from adults or teachers. In the absence of such a situational primer (e.g., high-stakes exam), the individual may report an incremental theory and be concerned with mastery (ibid). Teachers may also be affected by situational cues. For instance, teachers creating performance environments when pressured in high stakes exams (such as General Certificate of Secondary Education – GCSE's), which are comparatively measured on school league and accountability tables in England (Department for Education, 2019e) (discussed in Section 2.8). Teacher classroom goals may therefore prime students to temporarily adopt an incremental or entity theory, regardless of a learner's inherent and stable belief.

Furthermore, research demonstrates that teacher classroom goal structures correlate with student theory of intelligence (e.g., learning environments correlate with incremental theory endorsement, performance environments correlate with entity theory endorsement) (Park, Gunderson, Tsukayama, Levine & Beilock, 2016). However, despite correlations between teacher goal structures and student intelligence belief, teacher's own intelligence beliefs do not correlate with their own enactment of goal structures (e.g., teacher incremental belief results in creation of mastery goal structures) (Shim et al., 2013). Incongruence of intelligence belief and intelligence feedback practice therefore indicate situational factors may affect practice, rather than belief dictating practice. For instance, teachers may respond to events which are specific to the situation (e.g., time remaining in lesson, schemes of work and behaviour of students) and are required to feedback instantly, with limited consideration to their feedback (Buehl & Beck, 2014). Little research focuses on exploring environment and situational primers, in students and teachers. Therefore, the role of situational factors originally proposed by Dweck & Bempechat's (1983) are not fully understood and may play an influential role in understanding the structure and mechanisms of implicit theories of intelligence. The role of teacher's implicit theories of intelligence is discussed further in Section 2.2.1.

The Role of Confidence

Adding further complexity, confidence is noted as a behavioural moderator in the enactment of leaners' theories of intelligence. The model of achievement goals and patterns (Figure 2.1) indicates that students display behavioural responses dependant on their expectancy of success on the task. Given that entity theorists are concerned with avoiding negative judgments of their ability, confidence on task success moderates the type of behaviour according to the task. For example, low confidence in ability in a task causes an entity theorist to respond helplessly, as their aim is to conceal their perceived low ability. While, if an entity theorist holds high confidence in their ability, they may display a mastery response.

Theory of Intelligence	**Performance Goal Expectancy (success on task)**	**Achievement Goal choice**	**Achievement Pattern**
Entity Theory		PEFORMANCE GOAL	
	High →	Obtaining a favourable competence judgement	Mastery Oriented
	Low →	Avoiding a negative competence judgement	Helpless
Incremental Theory		LEARNING GOAL	
	High →	Increasing competence	Mastery Oriented
	Low →	Increasing competence	

Figure 2.1 Theories of Intelligence: Achievement Goals and Achievement Patterns.

Consequently, Dweck & Bempechat (1983) proposed that implicit theory of intelligence endorsement creates a differential likelihood of adopting one goal over another, as mediated by both the task and individuals' confidence.

While confidence is rarely discussed in more recent work (Dweck, 1999), what appears to be most important is that individuals should not dismiss their ability to improve or learn. As research indicates more results that are positive for incremental theorists in academic scenarios (Dweck, 1999). Research focus has therefore shifted toward belief change and investigating outcomes, as opposed to further understanding the mechanisms of implicit theories of intelligence, as discussed in the following Section.

Interventions

Given the reported benefits of holding an incremental theory (see Section 2.2), "mindset" interventions have been integrated into some schools, in order to assess changes in academic results and motivational outcomes in learner scenarios (Paunesku et al., 2015; Rienzo et al., 2015). Commonly taught across interventions is the concept of learners adopting a "growth mindset" (e.g., incremental theory of intelligence) in order to develop students' confidence in the ability to learn, take on challenges and work harder to grow intelligence (Briceño, 2017; Khan, 2019; Osiris Educational, 2019).

Teacher interventions have also been investigated, given teachers roles in facilitating learner progress and motivation (Anderman & Gray, 2017), as well as socialising theories of intelligence (Haimovitz & Dweck, 2017). Research interventions for teachers have investigated how to encourage educators to teach in accordance with growth mindset principles, for example using specific praise practices (ibid; see Section 2.4). Note, the literature below and following Section (2.2.1) uses both the common terms in school education among teachers and pupils (e.g., growth/fixed mindsets), as well as terms used in academia (incremental/entity) to contextualise appropriately. Terms are interchangeable (Dweck, 2006) (see Section 2.8).

Learner Interventions

The overarching aim of interventions is to raise achievement, motivation and enhance resilience when faced with failure, as well as attempting to establish a classroom-culture of growth mindset principles. For instance, avoiding helpless language (e.g., 'I can't do it') and to promote resilience (Dweck, 1999). Across learner interventions, students are commonly provided with research evidence, indicating that an incremental theory of intelligence is attached to more positive academic outcomes (Blackwell, 2007). While challenge is also considered an opportunity to grow intelligence. Schemes of work and resources are readily available for schools online as well as in-school training courses, following the reported success of some interventions in research (Blackwell et al., 2007; Claro et al., 2016). Courses include MindsetWorks (Briceño, 2017) (US) and Khan Academy (Khan, 2019) (US), while English training organisation Osiris offers In-Service Education Training (INSET) for teachers (Osiris Educational, 2019).

As previously noted, interventions in schools arose in response to research. The research by Blackwell et al. (2007) provides key literature in theories of intelligence, examining interventions with learners in the US. Within their research, Blackwell et al. (2007) conducted two studies, study 1 included tracking 5 waves of students (*n = 373*) across elementary to middle school in the US (7th grade to 8th - English equivalent from final year Primary to first year Secondary, approx. age 11). While the second study involved implementing an intervention to teach 7th graders (*n = 48*) an incremental theory of intelligence, with results compared to a 7th grade control group (*n = 43*). Note, this study did not focus on teachers. In study 1, theory of intelligence was measured (using Dweck's 1999, likert scale) at time one (elementary/primary school) along with math grade, followed by the measurement of math grade at time two one year later (middle/secondary school). Results indicated that the math grade of those students' with entity beliefs declined over time, whilst the math grade of those students' endorsing incremental beliefs increased, despite the same grade average as entity theorists at time one (See Blackwell et al., 2007 for path model of processes).

In light of study 1, researchers conducted a second study, implementing an intervention with students, again, in 7th grade. Both the control and test group were subject to eight 25 minutes sessions, following the same structure and some similar content (e.g., learning about brain structure, anti-stereotyping and study skills). However, a key difference between the groups was the experimental group receiving 2 of 8 sessions surrounding malleability of intelligence, whereas the control group received 2 of 8 sessions surrounding general intelligence language. The control group therefore had no content related to mindset. Prior to intervention, measurements included achievement (e.g., math grades) and motivational variables (e.g., theory of intelligence). Post-intervention measures assessed the recall and comprehension of the workshop, theory of intelligence, teachers' assessment of students' classroom motivation and behaviour and achievement outcomes. Results indicated positive changes for the experimental group, where theory of intelligence was altered. There was also a higher proportion of incremental endorsement, as students self-reported beliefs had altered. No change of intelligence belief was reported in the control group. In addition, there was a significant effect of experimental condition in relation to positive change in grades, following the intervention (Time 2 to Time 3; b5.53, t52.93, po.05). Teachers also blindly (e.g., unaware of control or experimental group) reported 27% of students as showing positive changes from the experimental group, in comparison to 9% in the control group.

To conclude results, researchers suggested that the incremental theory taught in the experimental interventional group resulted in an upward achievement trajectory, in comparison to the control group, where achievement declined over time. Given the positive results evidenced, the interventional study by Blackwell et al. (2007) provided a foundation for other researchers, who followed a similar methodology to investigate student outcomes, as discussed below.

A more recent intervention (Debacker et al., 2018) used the same materials as Blackwell et al., (2007), but in a single 55minute intervention session. Debacker et al.'s (ibid) study was undertaken comparatively to the work of Blackwell et al. (2007) to assess the effect of one large session as opposed to several smaller sessions. Two cohorts in two schools (4 cohorts in total) of USA ninth graders (ages 14 - 15) were selected. A control group was not feasible, due to the demands of the school. Given that there was no control, data from the intervention was compared one year later in tenth grade (ages 15 - 16), to scores of the previous tenth grade. Measurements of implicit belief of intelligence (Dweck, 1999) and achievement goals (e.g., learning goals: learning for mastery of tasks vs. performance goals: competence in relation to others) were taken pre-intervention (T1), two weeks post-intervention (T2), end of 9th grade academic year (T3) and beginning of new academic year - 10th grade students (T4). Results indicated modest support for the application of the single intervention, with elevated endorsement of an incremental theory in 3 out of the 4 cohorts (see Figure 2.2).

Figure 2.2 Means of Incremental Belief Scores T1 – T4.

Data from T4 indicated that individuals ascribing to an incremental theory of intelligence remained high one year later (from the two schools where T4 results were attained). In addition, those students adopting an incremental theory of intelligence were more likely to hold mastery goals (e.g., student goals to learn and improve skills for mastery).

The researchers noted that the intervention was not sensitive to student individual differences or school context effects, as data were taken from two schools with differing contexts and incremental endorsement displayed similar movement over time. However, two schools is a limited representation of context. Intervention effects were also reported lower than Blackwell et al. (2007), despite using similar materials. Causes for low effect were suggested to be a result of decreasing the amount of time for the intervention, which was presented across a 55minute session. As well as differences in the delivery of sessions and teacher practice, which could be argued as a contextual difference.

Another intervention (UK based) was undertaken in Scotland by Donehoe, Topping & Tomak (2012), where 33 13 – 14 year old students were required to take part in an online growth mindset training programme across 4 x 40minute individual computer sessions. Theory of intelligence and resilience (including 3 sub-scales of sense of mastery, sense of relatedness and emotional reactivity) were measured pre-, post- and follow-up intervention. Results indicated students undertaking the online growth mindset intervention benefited from short-term impact of an incremental theory, post-intervention. However, increased incremental endorsement was not maintained in follow up results. Reported implicit theory of intelligence means were pre: 4.28, post: 5.08 and follow up: 4.44 (4 – 6 indicated high incremental endorsement in this study). Finally, when following up academic results of examination one year later, there was no significant difference between the academic performance of the intervention and comparison groups ($F(2, 34) = 2.2$, $p = .15$). The researchers concluded that the intervention only had a temporary impact on students' mindsets, and that differences in sociocultural and attitudes (e.g., students' peer perceptions) may be contributing factors to temporary impact of the intervention. While it was also noted, that future research which focuses on maintaining the initial increase in growth mindset endorsement would be beneficial. Furthermore, other researchers have also suggested it is only possible to maintain the positive effects of interventions through teacher behaviour and teaching for a growth mindset (Green, 2013; Sun, 2015).

Learner and Teacher Interventions

Given the benefits reported of interventions and the potential role of teachers in maintaining primed student beliefs (Blackwell, 2007; Debacker et al., 2018; Paunesku et al., 2015; Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018), the Education Endowment Foundation (EEF) charity (England) also explored an intervention to alter theory of intelligence in an English context, called Changing Mindsets (Rienzo et al., 2015). Alongside a student intervention, the researchers tested a teacher intervention, which aimed to alter intelligence belief and increase incremental intelligence feedback practices of teachers (e.g., focus on process). The researchers theorised that the teacher intervention would raise student achievement through teachers' incremental practices and socialising incremental theories of intelligence (e.g., praise for process, emphasis on effort and challenging activities – see Section 2.2.3). Details of both the learner and teacher intervention studies are outlined below.

In the student intervention six primary schools were involved, where Year 5 (ages 9-10) pupils (n = 286) took part in a series of six workshops. Students were assigned to either the mindset intervention (n = 144) or the control intervention (n = 142). As similar to previous learner interventions (Blackwell, 2007 and Debacker, 2018), the aim of the workshops was to change student's beliefs to incremental. The interventional content included 6 sessions, similar to those in Blackwell et al.'s (2007) intervention, with a control group following a closely related format. Although, more of the learner sessions excluded theory of intelligence interventional content at 3 of 6, as opposed to 2 of 8 in Blackwell's (2007). Following the interventions, results were assessed through reviewing English and Maths results and theory of intelligence across three time points: (T1) pre-intervention, (T2) four months post intervention and (T3) ten months post intervention.

Results indicated those students on free school meals (FSM), an English indicator of lower family income, poverty and socio-economic status (Department for Education, 2018), were more likely to change their entity beliefs to incremental (reported effect size 0.17). While all students English (effect size 0.18) and Maths (effect size 0.11) abilities were increased by 2 months post intervention, (details of increase are not provided in the study). Note, the minimum detectable effect size was estimated to be in the range of 0.4 to 0.5 standard deviations (Rienzo et al., 2015, p. 12). Despite potential positive findings, the authors note caution, as statistically results were not significant. Therefore, validity is questionable and claims for intervention success cannot be made.

In the same project, teachers across 13 schools were involved in an In-Service Education and Training (INSET) intervention, across two half days. Results were compared to 11 schools in the control group, subject to no additional INSET. Teachers in the changing mindsets INSET training were educated on how to teach for growth mindset (e.g., encourage persistence through failure, using different strategies, praising for hard work – see Sections 2.2.3 & 3.10). The intention of the sessions were to alter teacher intelligence feedback practice, and intelligence belief, in an attempt to maintain student belief in school. Notably, as teacher use of intelligence feedback is linked to student intelligence belief (e.g., teacher use of incremental intelligence feedback correlated to student endorsement of incremental belief) (Schmidt, 2015). Despite the intervention, the pupils of those teachers taking part in the intervention (n = 628) made no additional progress in comparison to the control group. Further to this, in the subject of English a negative effect was noted at -0.11, indicating a decline in student achievement following the intervention.

The reason for a lack of student progress, in both learner and teacher studies, was suggested to be as a result of some schools within the sample already applying incremental principles, as this was not accounted for. Results of the EEF study therefore indicate a flawed research design and low fidelity. It was also noted that some teachers applied the principles of a growth mindset, whilst others in the school failed to do so. It could also be argued that no additional progress was a result of lack of support and inappropriate follow up, for example, teacher practice following the INSET training was not observed. Rather, practice were measured using self-reports, which may not be a valid representation of practice, given individuals are known to report socially desired practices and not actually enact them (Olafson, Grandy, & Owens, 2014). It was unclear whether teachers were applying strategies learned within INSET across lessons, or teaching elements of their mindset intervention as individual lessons, if at all.

Consequently, the EEF undertook a waitlist control trial to follow up the original research project (Rienzo et al., 2015) with primary teachers, across 101 schools in the UK (Foliano, Rolfe, Buzzeo, Runge, & Wilkinson, 2019). Schools were only eligible providing their year 6 cohort had not engaged with any growth mindset training in the past, to address the limitations of their previous study (Rienzo et al,. 2015). The new 2019 intervention consisted of teachers attending an intervention to equip them with the necessary skills and tools to apply growth mindset in their intelligence feedback practice and teach growth mindset principles to students. Following the intervention, teachers were asked to deliver 8 sessions about growth mindset to learners, across an 8 week period, as well as apply Growth Mindset (GM) in their teaching. However, researchers gave flexibility of sessions to be shorter or more frequent, in order to provide schools with ease of integration into pre-existing timetables. Materials were provided by the research team, and teachers could decide how long to run sessions and what content to include. The primary aim of the project was to assess whether teacher intervention could raise year 6's end of year National Curriculum Test (NCT) results. While the secondary aim was to assess the impact of teachers' use of growth mindset on learners' motivation, effort, seeking behaviour, and attitude towards tests; measured using four subscales of intrinsic value, self-efficacy, test anxiety, and self-regulation.

To assess results of the teacher intervention, researchers collected end of year NCTs results, which were compared with NCTs results of students whose teachers had not taken part in the intervention. Other methods included interviews with teachers and senior leaders, focus groups with pupils, and observations of lessons, to assess the fidelity of the intervention (identified as high within the report). Key findings indicated the pupils of teachers who undertook the intervention and taught GM principles to their students did not make any additional progress, in comparison to the control group. Teacher intervention in school had no impact of significance on learners' four non-cognitive measures, comparative to the control group. Learners in receipt of free school meals made no additional progress, comparatively to the control group. The researchers noted a lack of additional progress for all learners could have been as a result of teacher awareness of GM, as over a third reported previous training in GM. Again, as teacher's were already aware of GM, it is difficult to assess if they were already teaching principles of GM, as pre-intervention assessments were not undertaken to assess the use of GM intelligence feedback pre-intervention. Other possible explanations for non-significance across all measures were too much variation across teacher led intervention and the learners were too young to understand and apply concepts. Throughout the intervention, teachers were given the opportunity to feedback upon their GM lessons, providing information on how much content they used from the material provided and how much they adapted. Unfortunately, response rates were low, and therefore it was not possible to assess which practices they were or were not implementing. Further to this, when visiting schools in fieldwork, the researchers reported teachers buy-in into the concept of GM was high (e.g., teachers believe in training is useful and applicable for own practice).

Overall, both EEF reports, indicated that the teacher interventions did not appear to work and GM did not result in higher attainment, comparative to control groups. To reiterate, a growing body of research, now questions the value of teacher interventions in the altering of teacher intelligence belief to affect student academic outcomes (Donohoe, Topping, & Hannah, 2012; Schmidt, 2015). Therefore, research, which explores the mechanisms of teacher intelligence belief and teacher use of intelligence feedback practice, may be more beneficial then interventional work. As research that assesses teacher use of intelligence, feedback may provide further details of how and why teachers enact intelligence feedback. Further understanding teacher intelligence feedback may assist with future altering of teacher practice for improved student effort and academic outcomes. However, at present, there is limited understanding of teacher intelligence feedback in-situ (see Section 2.4 for discussion). Details of practices associated with implicit beliefs of intelligence are discussed in Sections 2.3.2 and 3.10.

This Section has presented mixed findings, where some interventions have evidenced learner interventions which are successful at raising academic achievement, through targeting beliefs about intelligence (Blackwell, 2007). While others, predominately UK based, present findings which are not statistically significant in improving student outcomes (Donohoe et al., 2012;

Rienzo et al., 2015). What is apparent across the literature is that studies initially focused on student intelligence beliefs and the associated positive outcomes. However, given the mixed findings of interventions, research began to shift toward teacher beliefs of intelligence and practice associated with implicit theories of intelligence, as teachers are identified as key in maintaining primed beliefs of students, through their practice (see Section 2.2.2).

The previous Sections were aimed at contextualising the present Doctoral study through providing details of how and why implicit theories of intelligence have been widely researched in education (e.g., raising student attainment), as well as placing the teacher participants of this study in the wider literature. The Sections which follow will present research which is teacher focused, whilst building on research discussed previously in order to narrow focus towards the participants of this study.

2.2.1 Teachers' Implicit Theories of Intelligence

At present, research suggests teachers can cultivate growth mindset classrooms, through specific intelligence feedback practices, which socialises a theory of intelligence to students (Osiris Educational, 2019; Rissanen et al., 2019; Song, 2018). Teacher intelligence feedback can be categorised as either incremental or entity, in accordance with teacher intelligence feedback (e.g., a form of teaching practice). For instance, incremental intelligence feedback includes teachers focusing on the process of learning (Kamins & Dweck, 1999; Mueller & Dweck, 1998), challenging both high and low achievers (Song, 2018), providing opportunities to fail and overcome failure, and encouraging student persistence (Fraeyman, 2020). In contrast, entity intelligence feedback includes praise for attainment, failure to provide challenge, lack of strategies for overcoming difficulties and comfort for failure (ibid). Teacher incremental intelligence feedback is therefore associated with encouraging pupils to learn, develop and achieve (e.g., focus on process of learning), while entity intelligence feedback is maladaptive to learning and detrimental to achievement (e.g., focus on person).

Details of specific practices and examples in the literature, related to teacher intelligence feedback, are further discussed in detail across Sections 3.10 and 3.11. The decision to focus on teacher feedback and implicit theories of intelligence in Chapter 3 was made due to the observational method and associated framework, which was extensively underpinned by key literature. To summarise some of the studies across Sections 3.10 – 3.11, as relevant to this section of the literature review, research indicates that teacher intelligence beliefs may influence teacher intelligence feedback (see Table 2.2). While other research suggests there is non-alignment with teacher intelligence belief and teacher intelligence feedback. Therefore, there is both congruence and incongruence between teacher intelligence belief and intelligence feedback (e.g., teacher holds incremental belief, but does not always provide incremental feedback). Examples of intelligence beliefs and associated teacher intelligence feedback, as provided in the literature, are outlined in Table 2.2.

Table 2.2 Examples of Teacher Intelligence Belief and Intelligence Feedback

Study	***Teacher Practice associated with Entity Theory of Intelligence***	***Teacher Practice associated with Incremental Theory of Intelligence***	***Congruent with self-reported theory of intelligence***
Rattan, Good & Dweck, 2012	Comfort feedback e.g., don't worry not everyone is good at this – failure to encourage persistence, resulting in student giving up	N/A	Yes
Shim, Cho & Cassady, 2013	Performance goal structures e.g., creation of competitive environments and attainment comparative to others. Attainment to be the highest achiever, indicating failure if not.	Learning goal structures – e.g., development of self and results used to learn/correct mistakes.	Yes
Rissanen et. al (2019)	Trait focused pedagogy for higher achievers – teacher concept of giftedness, lack of persistence	Supporting individually students learning process, motivating power of success	No
Muller & Dweck 1998; Kamins & Dweck 1999	Person feedback – suggesting innate, trait based qualities for failure and/or success (e.g., you are clever, innate)	Process feedback – suggesting malleable, psychological based qualities for failure and/or success (e.g., you've worked hard, malleable)	N/A

Socialising Implicit Theories in Teacher Practice

Haimovitz and Dweck (2017) present a hypothesised model which explores teachers' implicit theories of intelligence socialisation to children and learners. Understanding the process of intelligence belief socialisation is important, as intelligence feedback which promotes incremental behaviours of students may assist with maintaining students' primed incremental belief, post intervention, as previously discussed (see Section 2.2.1) (Blackwell, 2007; Debacker et al., 2018; Paunesku et al., 2015). Dweck and Yeager (2019) have also identified that shaping the beliefs, values, and behaviours of students through teachers, in their educational environments may be more successful than interventions alone. As 'growth mindset climates' which adopt a whole school growth mindset, may ensure a consistent approach to the implementation of incremental intelligence feedback. However, research in the areas of whole school growth mindset initiatives is yet to be studied, and outside the scope of the current research area.

Haimovitz and Dweck's (2017) model of teacher theory of intelligence socialisation to children/learner (Figure 2.3) begins with an achievement event, identified as a learner 'success' or 'failure'. The achievement event can prompt either teachers' beliefs about intelligence, how to motivate students or a combination of both intelligence and motivational beliefs. The hypothesised cognitive process determines the type of intelligence message relayed to the student about their achievement event (e.g., person or process praise), dependant on which belief or beliefs are salient (e.g., intelligence and/or motivational). Person-praise is associated with the socialisation of entity beliefs (e.g., you are clever), suggesting innate intelligence. Process-praise, rather, is aligned with socialising incremental beliefs (e.g., you have worked hard), attributing child success to effort. Haimovitz and Dweck (2017) suggest theories of motivation might be more easily accessible than intelligence beliefs. The reasons for differences in belief accessibility, intelligence or motivation, however, are not discussed.

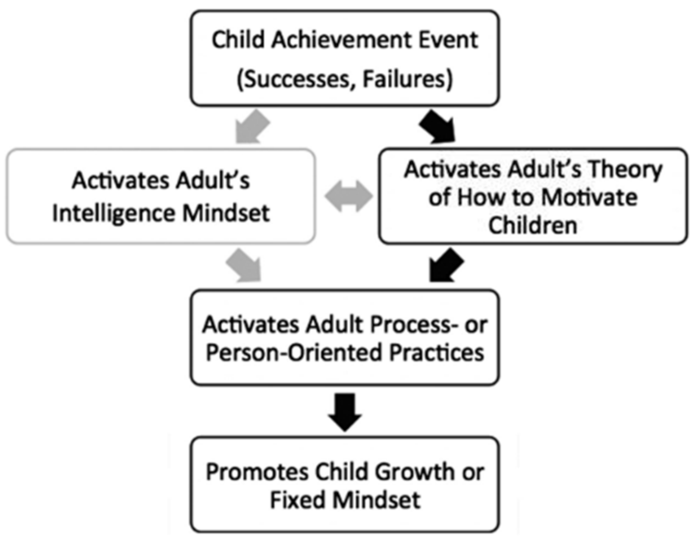

Figure 2.3 Hypothesised Model for the Socialisation of Implicit Theories of Intelligence.

Although useful in exploring how intelligence beliefs are socialised to students by teachers, the model of teacher belief of intelligence socialisation does not account for other potential influences, which may affect intelligence feedback. In a school, for instance, that has an overarching ethos of promoting persistence through failure (an incremental theory); the teacher may be more inclined to use process-orientated praise irrespective of their own intelligence belief (see Hargreaves, 1995). Or where there are high-stakes exams, teachers may create performance scenarios to motivate students to work harder, which socialises entity intelligence feedback (Shim et al., 2013). Recent research from Finland, discussed below, also suggests that the enactment of teacher intelligence belief in the classroom is influenced by wider environmental factors, such as culture (Rissanen, Kuusisto, Hanhimäki & Tirri, 2018a). For example, the prominent Finnish belief of taking care of the weakest was identified as influencing teachers' instruction in a recent study (ibid).

Within the classroom, learners experience a multitude of learner events, rather than success or failure (e.g., reviewing task, teacher prompts to motivate, and reviewing learning). Therefore, it could be argued that the prompting event of child success or failure is scarcely observed in the naturalistic environment. Specific areas of focus in relation to learner events were identified in Sections 3.10 and 3.11. As studies have found teacher intelligence beliefs, are not always enacted in practice (Rissanen et al., 2019), it would be beneficial to investigate other influences on the enactment of intelligence beliefs and teacher attributions for their own feedback, to better understand teacher intelligence feedback practices.

Teacher Intelligence Beliefs and Intelligence Feedback

Surveying the literature, two Finnish studies by Rissanen et al. (2018a; 2019) explore implicit intelligence theories of teachers. Given that these studies include teacher intelligence beliefs investigated in the classroom, they were identified as key literature to this thesis. Within their work, the researchers explored the operation of teacher implicit theories of intelligence in practice, using recorded lessons to question teachers on specific events, related to implicit theories of intelligence in-situ. Given that the research by Rissanen et al. (ibid) was undertaken in Finland, their studies are contextualised by the Finnish educational system, which includes mixed ability setting, a focus on teacher autonomy, flexibility in the curriculum and first national exams held in Secondary School (Finnish National Agency for Education, 2019). Methodology used across both studies was also similar to the methods used in this thesis, including the use of qualitative and quantitative methods. Rissanen et al. (ibid) undertook self-reports of giftedness, observations and interviews (including stimulated recall). Therefore, the works provided a strong theoretical background to this Doctoral thesis (see Chapter 3).

In the first study published (Rissanen et al., 2018a) participants were two specialised comprehensive teachers (grades 7 – 10, ages 13 - 16), one entity theorist - teacher of maths, and one incremental theorist - teacher of languages. Participants were required to complete Dweck's (1999) implicit theory measure, with a focus on giftedness, rather than intelligence (e.g., our giftedness is something very basic about you that you cannot change very much). Notably, as giftedness in Finland is more of a commonly used term to describe high intelligence (see Rissanen et al. 2018a for details). Teachers were also required to take part in stimulated recall interviews from recorded observations, where participants viewed events from a lesson to elicit direct reflection on specific events. Teacher lesson events were termed critical incidents. The research team chose the critical incidents, where teachers appeared to be interpreting students' behaviour, learning, or achievement and acting according to interpretations. Therefore, the aim of the first study was to explore teacher's interpretations of students' behaviour, qualities and learning in-situ, along with actualisations of teacher belief in-situ. The second study followed the same methodology, with one mixed theorist teacher, who was a teacher of grade 1 – 6 (ages 7 – 13) (Rissanen et al., 2019), and taught all subjects - as is the norm in Finnish elementary education (Finnish National Agency for Education, 2019).

Findings of study 1 indicated that the teacher reporting high incremental theory of intelligence was more likely to attribute student behaviour toward learning, encourage new learning strategies and focus on the process of the students learning. In contrast, the entity teacher was more focused on commenting on student traits and talents (Rissanen et al., 2018a). Although researchers also found non-alignment of the same teacher's intelligence belief and intelligence feedback in some areas. For example, the incremental endorsing teacher also provided trait-focused (e.g., person-feedback) feedback. Trait/person-focused feedback indicates teachers are pleased with student competence as a fixed innate aspect of students' intelligence, therefore socialises and primes an entity intelligence theory (Haimovitz & Dweck, 2017). While the incremental teacher displayed intelligence feedback reflective of their intelligence beliefs, there were multiple instances of non-alignment between their belief and practice. Similarly, in study 2, the mixed self-reporting teacher failed to recognised students' entity beliefs and behaviours (e.g., lack of persistence and challenge), and thus further counteract these with incremental practices (Rissanen et al., 2019). Instead the teacher relied heavily on the motivational power of success (e.g., praising for current or previous success and therefore person-praise) (Dweck, 1999), rather than using failures and challenge to promote perseverance across difficult tasks.

Across both studies, researchers concluded that the framework of the Finnish educational system may be a contributing factor for some teacher feedback. Notably, within the Finnish educational system, students are not streamed or ability tiered and therefore teachers are required to differentiate learner work across large range of abilities (Finnish National Agency for Education, 2019). As Finnish culture encompasses taking care and supporting the weakest, researchers suggested supporting the weakest was a detriment to higher ability pupils, who required additional challenge. As failure to provide additional challenge socialises an entity theory of intelligence (Dweck, 1999) (see Sections 2.2 and 3.10). A key finding across both studies was the identification that teacher feedback and practice (e.g., learning environment creation) was bound by the Finnish culture and context. Specifically, cultural beliefs were identified in teacher beliefs about students' giftedness and natural talents. Therefore, the influence of context appeared to play a significant role in teacher intelligence feedback, in Finland.

Although useful in highlighting the role of context, results were contextualised in Finland, therefore, it is important to collect further results in other countries, in order to explore if context and culture affect teacher intelligence feedback. The concept of giftedness, which was used as the self-report measure, also differs from English teachers' concept of intelligence. Research indicates teachers in England are uncomfortable with the use of giftedness to identify their students (Koshy & Pinheiro-Torres, 2013) (see Section 3.10.3), therefore it is important to research other contexts and cultures to explore differences. Furthermore, both studies contained a total of three teachers and a lager sample would be beneficial in providing further data to the literature.

Teacher Cultivation of Incremental Beliefs

Another recent study, which focused on teacher practice and implicit theories of intelligence, was identified in the work of Song (2018). In her thesis, Song sought to explore how elementary school (e.g., primary school, ages 5 - 11) teachers cultivated incremental beliefs in the classroom, notably in order to improve attainment. Methods were qualitative only, and included observations to monitor behaviours, field notes and interviews. Seven teachers were chosen from the sample school, through purposive sampling. All teachers were of various specialisms, however responsible for teaching one class across one grade, each academic year. Findings revealed that teachers established classroom environments reflective of incremental beliefs and behaviours through taking on facilitator roles, creating a positive culture, and using incremental focused language (e.g., praising students for the process of learning). Further to this, the seven teachers held the collective belief that learning was a process, and were also concerned with building student self-efficacy (e.g., instilling beliefs students were capable of achieving goals), as well as developing competence. The research (Song, 2018) draws parallels with Rissanen et al. (2018a) who also identified similar use of teacher incremental feedback to students, for instance praising for process. Despite the findings in Song's (2018) work, it was not possible to compare teacher feedback with belief or areas of incongruence, as teacher belief was not measured.

False Growth Mindset

Surveying the limited literature of teacher intelligence belief and teacher intelligence feedback, research indicates non-alignment in naturalistic scenarios. In response to the non-alignment of teacher intelligence belief and practice, Yeager et al. (2019) suggest that teachers many succumb to a "false growth mindset". A false growth mindset is identified as teachers reporting incremental beliefs, however are not conscious of their entity feedback in practice. For example, praising for effort will socialise an incremental belief to students, however giving little attention to whether a student was in fact putting in effort would counter the effects of effort praising. In such a scenario, a student may feel incompetent, as their effort does not lead to results and teacher has praised for a lack of effort. Furthermore, teachers may fail to embody other 'growth mindset' principles, such as encouraging new strategies or provide guidance for students. Other examples are cited as teachers believing they establish a culture of growth mindset, however merely create displays or reprimand students for failure to adopt growth mindset principles. While there is little direction to students about how to embody a growth mindset across their work. More research is therefore suggested by Yeager et al., (2019), in order to better understand teacher socialisation of intelligence beliefs in the naturalist classroom.

Summary

Through the identification and exploration of culture, context and individual beliefs (Rissanen et al., 2018a), it may be possible to understand why and how teachers provide feedback which is non-aligned to their intelligence beliefs. Furthermore, Yeager et al., (2019) note that understanding and tailoring to context may assist with more successful interventional outcomes for students. Examples of other influences on teacher use of intelligence feedback could include workplace environment (e.g., school ethos), the broader educational landscape (e.g., policies and government) and support networks (e.g., other members of staff). Potential contextual factors which influence the enactment of beliefs, are discussed in Section 2.5. However, beforehand, beliefs on the whole, will be summarised and discussed to underpin the overall belief system.

2.3 The Belief System

Literature pertaining to the nature of beliefs, formation of beliefs and operation in relation to practice (e.g., feedback) is discussed in the sections that follow, with specific reference to beliefs as framed by the theories of intelligence literature (Dweck, 1999; Haimovitz & Dweck, 2017). Notably as intelligence beliefs are encompassed in a wider belief system, which can interact and guide behaviour (Rokeach, 1969). Outlining the structure and conception of beliefs is important as provides details of how beliefs function and identifies how they can shape behaviour. To reiterate (Section 2.2) the terms intelligence beliefs and theories of intelligence are used interchangeably throughout the thesis.

2.3.1 The Nature of Beliefs

Beliefs are a major factor in shaping an individual’s behaviour and are formed through prior experience, emotion, knowledge, culture and context (Fang, 1996; Fives & Buehl, 2008, 2016; Fives & Gill, 2014a; Pajares, 1992). In the context of teaching, beliefs play an integral role in guiding classroom decisions and actions. For example, where teacher beliefs about student expectations affect teacher classroom management (Levin, 2014) (see Sections 2.2.2 and 2.2.3). As the participant focus of the current thesis is on teachers, the sections below outline research in the field of teacher-beliefs, which draws upon and discusses the general belief research (Ajzen & Dasgupta, 2015; Ponser et al., 1972; Piaget, 1976; Rokeach, 1969).

Conceptual Considerations

Definitions and clarity of terms across teacher belief research are widely discussed throughout the literature. This is due to complexities of belief structures and systems, which interact with wider context and situational factors (e.g., students in classroom) (Fives & Buehl, 2016; Fives & Gill, 2014a; Skott, 2014). Inconsistences in understanding and lack of clarity has arisen through the use of various terms, as researchers have attempted to separate beliefs from other terms (e.g., perception, attitudes, values, emotion, knowledge and conceptions) (Skott, 2014, p. 18). The following Section aims to conceptualise teacher beliefs for the reader, in relation to this Doctoral study.

Parajes (1992) states that beliefs "travel in disguise and often under alias" (p. 309), adding further that the history of teacher belief research is a "messy" construct. The messiness Parajes (ibid) refers to is caused by definitional problems, poor conceptualisations and differing understandings of beliefs and belief structures. Fives and Buehl (2012), some ten years later, also identified that defining teachers' beliefs is not necessarily difficult, rather, it is in the lack of consistency across terms. Therefore, when discussing the nature of teacher beliefs within this Doctoral research, defining teacher beliefs and providing a theoretical framework was deemed vital in order to provide consistency and clarity.

According to Pajares (1992) confusion arises when distinguishing and separating knowledge and beliefs. In the early work of Rokeach (1969), which provided a foundation for understanding the belief system, beliefs are defined as "any simple proposition . . . inferred from what a person says or does, capable of being preceded by the phrase 'I believe that . . .'" (p. 113). Following Rokeach's definition, it is possible to directly ask individuals what they believe. Although stated accuracy of a belief is questionable, as beliefs and behaviour are commonly non-aligned (Fives & Gill, 2014a), it is important to use multiple methods in order to uncover beliefs (ibid) (see Chapter 3).

In separating knowledge and beliefs, Fives and Buehl (2012) postulate beliefs as subjective, what an individual accepts as true and their preferred conceptions of understanding. Knowledge, rather, has a "truth component", agreed upon by a wider community, which can be "externally verified" (ibid, p. 476). In other terms, a belief which is affirmed as knowledge through evidence and general consensus (Kagan, 1992). Applying belief and knowledge to teaching specifically, Kagan (1992) states that "most of a teacher's professional knowledge can be regarded more accurately as belief" (p. 73). Knowledge and belief are interwoven, due to the complex nature of the classroom, where teachers draw upon their knowledge and apply what they believe to be true to a given context or situation. Thus, it is important to recognise the integration of the two when attempting to understand the roles of knowledge and, or, beliefs in the exploration of teachers' practice (e.g., intelligence feedback). Consequently, it is not always possible to separate beliefs and knowledge (Parajes, 1992).

Adding further complexity, Kagan (1992) describes teacher application of professional knowledge is better understood as a form of belief enactment. For example, teachers may draw upon previously acquired knowledge, resulting in deploying practices and feedback, which are deemed most appropriate by the individual in accordance with their beliefs. Feedback is in response to the specific unique events teachers are engaged with, whilst contextualised by various factors (e.g., students, school, class size, and subject) (see Section 2.5). Consequently, if teachers are drawing upon beliefs, which are guided by knowledge, it could be argued that some teachers may be more inclined to engage in ill-informed practices. For example comforting students when failing, as opposed to providing strategies for success (Muller & Dweck, 1998).

This is evidenced in theories of intelligence where teachers have used intelligence-praise (e.g., well done, you are clever) based on common misconceptions about student motivation (Mueller & Dweck, 1998; Haimovitz & Dweck, 2017). In research, teachers expressed beliefs that using intelligence praise would boost students' self-esteem, however this type of praise is documented as detrimental to students' progress (ibid). In addition, research indicates that many educators are unaware of any subtle differences in their intelligence feedback (Skipper & Douglas, 2012). Research therefore suggests teachers engage in reflective practices in order to contribute to further understanding their own enactment of beliefs and practice (Fives & Buehl, 2012).

As evidenced by the studies above, there are continued issues with both the separation of beliefs and knowledge, as well as the multitude of definitions, which exists throughout literature. Overall, researchers agree that teacher stated belief, actualisation of belief and beliefs of appropriate knowledge application are complex to study. This complexity is also due to the mechanisms of the belief system and the role of context in relation to beliefs (Fives & Buehl, 2012; Fives & Gill, 2014a). Clarifying terms and exploring arguments in the literature aims to provide the reader with an understanding of how key terms were applied, understood and explored within the context of this Doctoral study. Although it is recognised, that the nature and definition of belief is both an ongoing debate and can present issues in the literature because of conceptual differences.

The Belief System

Exploring the belief system, early research indicated that the more central a belief is to an individual's identity, the more difficult it is to change (Posner et al., 1982). For example, beliefs that make up an individual's identity are central (e.g., family background, religion and gender). Building on the ideas of Piaget (Piaget, 1976), central or pre-existing beliefs can be applied to understand and integrate new concepts into the belief system, a process termed assimilating (Posner et al., 1982). Accommodation occurs when former beliefs do not bridge the gap between old and new concepts, therefore reorganises or replaces existing beliefs (ibid). Newer and more isolated beliefs are at the most unstable end of the continuum, while deeply engrained beliefs are on the most stable end of the continuum and less susceptible to change (Ajzen & Dasgupta, 2015; Fives & Buehl, 2012). Some beliefs can be relatively stable, whereas others are susceptible to change (ibid).

In addition, individuals can also hold conflicting beliefs simultaneously (Fives & Buehl, 2016). Individuals purposefully seek evidence which supports their belief, whilst excluding that which opposes it (Fives & Gill, 2014a; Pajares, 1992). Overall, early work (Posner et al. 1982; Rokeach, 1969) on formation and organisation of the belief system is still commonly accepted as a basis for the belief system.

Specifically to teacher research, the belief system, as described above, also proposes that stability and centrality are subject to individual differences (Fives & Buehl, 2016). Notably as beliefs are "an individual's representation of reality or what an individual holds to be true, whether or not evidence supports that representation" (Fives & Buehl, 2016, p. 115). Researchers have also discussed whether beliefs are context-dependant (e.g. beliefs which are shaped by context) or context-independent (e.g. beliefs exist externally to context and unchanged across contexts) (Posner, Strike, Hewson, & Gertzog, 1982).

Fives and Buehl (2012) argue it is the specificity of a belief and whether the studied belief is specific or general, that must be considered, rather than dependant or independent on context. The more specific a belief, the more likely it is to change and be changed, in relation to the environment (ibid). While research also indicates that teachers hold "personal beliefs about the school community that in turn influence and are influenced by the school environment and his or her own behaviours" (Fives & Buehl, 2012, p. 476), thus important to consider wider environmental influences of teachers. For example, teachers may hold a belief about the nature of intelligence generally, which is maintained across contexts (e.g., lower set students are of lower intelligence). Although, more specific beliefs may be further held in relation to a domain (e.g. maths, art, geography etc.), or learning skill (e.g. football, reading, playing an instrument etc.). Considering the specificity of the belief in question and the belief should therefore be assessed in line with the construct of the belief (ibid.).

A final consideration is the relationship between beliefs and attitudes. As previously discussed (Section 2.3), beliefs are described as an individual's subjective understanding, which can guide behaviour (Fives & Beck, 2012). Attitudes, rather, are described as a negative, neutral or positive judgement, related to others, objects, attributes, places, and events (Fabrigar, MacDonald & Wegener, 2005; Fishbien, 1967). There are three components of attitudes, identified as affective (e.g., emotional response), behavioural (e.g., response towards attitude object) and cognitive (e.g., belief about attitude object) (Rokeach, 1969). Therefore, beliefs are important in the formation of an attitude, as they are the cognitive component (Fishbien & Ajzen, 1974). Whilst the current PhD research was not concerned with the study of attitudes (e.g., judgements), literature was referenced for wider consideration in order to acknowledge that beliefs form attitudes and attitudes can affect behaviour (Richardson, 1996) (Section 7.3).

Overall, the research questions within this Doctoral thesis were focused on teacher intelligence belief in relation to teacher intelligence feedback – as guided by the literature in the field, which is concerned with beliefs in relation to teacher behaviour (Haimovitz & Deck, 2017). Context was also a consideration in influencing belief enactment. While the specificity of belief and context were deemed important to further investigate when studying intelligence beliefs and intelligence feedback (e.g., belief-practice).

2.3.2 Teachers Beliefs in Pedagogy: Definitions and Role

As noted previously (Section 2.3) the beliefs of teachers are central to guiding practice. To reiterate, Fives and Gill (2014b) state "teachers' beliefs are part of a complex multidimensional system" (p. 7). Beliefs can be contrasting, general or domain specific as well as interwoven with knowledge. Therefore, uncovering the role of intelligence beliefs and influence on intelligence feedback may assist our understanding of teacher practice. Despite the broad selection of literature surrounding teachers belief, however, Skott (2014) identified "we still do not know what we are talking about, when we talk about beliefs" (Skott, 2014, p. 20). Other researchers have also agreed there are difficulties in the identification of shared terminology and definition, again suggesting a central aspect of studying beliefs is in the separation of belief and knowledge (Erkmen, 2012; Ertmer, 2005).

Belief Measurement

In the early work of Pajares (1992), which provided key literature for the field, a comprehensive insight into the importance of teachers' beliefs is provided. Parajes (1992) reiterated the work of Rokeach (1969), noting a belief can only be inferred from what teachers' say, intend and do. Therefore, it is the actions of teachers that may be of most importance when studying beliefs. It has been argued that most appropriate way to truly understand and measure beliefs is therefore through interviews, discussion and observations (e.g. qualitative measures), in order to uncover the motivators and behaviours directed by the beliefs (Parajes, 1992). Using observations in isolation, to measure beliefs, poses difficulties in providing a true representation of behaviour, as observations require interpretation by researchers. While, those who rely solely on quantitative means may exclude depth of understanding. More recently, mixed-method approaches have been described as "a strength when studying teachers' beliefs" (Levin, 2014, p. 59), as quantitative measures can be used to asses beliefs, whereas qualitative measures can be used to investigate in more detail about the development of beliefs through rich data collected (see Section 3.4) (Schraw & Olafson, 2014). Recognising previous research, the methods within this Doctoral thesis were therefore underpinned theoretically, using the key teacher belief research of Pajares (1992), Rokeach (1969), Skott (2014) and Fives and Buehl (2012). Methods chosen were self-reports, observations and interviews, see Section 3.4 for details of the mixed-methods approach of this Doctoral study.

Definition and Nature of Teacher Beliefs

While there are multiple conceptualisations of beliefs across the literature, the definition followed within this Doctoral research was by Skott (2014). According to Skott (2014), the common core concepts of teachers' belief can be summarised into four key parts. The four parts of belief conceptualisations are as follow:

1. An individuals' mental construct that is subjectively true (e.g., individual's belief)
2. There are cognitive and affective aspects to beliefs (e.g., perception and valence)
3. Beliefs are relatively stable - if left un-probed or un-primed
4. Beliefs influence teaching practices and behaviour within context
   (ibid, pp. 18 – 19)

To summarise literature on the belief system, the methodology of this Doctoral thesis reflected the four points of belief definition above and was embedded in researcher positioning (Section 3.2.1). For example, given that each individual possess their own 'truth' of a belief (e.g., point 1 - intelligence is different for all), teachers were asked to state their theory of intelligence (e.g., point 2 – identifying perceptions). Observation and interview data were analysed in relation to self-report theory of intelligence and interview statements (e.g., points 1, 2, 3) (Dweck, 1999), then further explored with practice (e.g., points 2 and 4). Context was also explored with teachers (e.g., point 4), in an attempt to identify the role of context on intelligence belief enactment (see Section 2.5).

2.4 Intelligence Beliefs and Feedback

This section aims to combine research on beliefs, presented in Sections 2.3.1 and 2.3.2, teacher theories of intelligence (Section 2.2.1) and teacher intelligence feedback. The element of teacher practice which were studied in this Doctoral thesis were teachers' use of intelligence feedback (e.g., verbal, learning and instruction) in the classroom. Intelligence feedback was used to conduct assessment of teacher's beliefs about their teaching and learning observations (see Sections 3.10 & 3.11), and linked to previous literature presented throughout Chapter 2. Feedback pertaining to intelligence included, but was not limited to, praise (Cimpian, Arce, Markman, & Dweck, 2007; Pinter, East, & Thrush, 2015), critique (Meyer, 1992), motivational strategies (Dweck, Chi-yue, et al., 1995; Lin-Siegler et al., 2016), comforting students (Rattan et al., 2012) and goal structure establishment (Debacker et al., 2018; Shim et al., 2013). To reiterate from Section 1.1.3, feedback in this Doctoral study was identified as bridging the gap between what is understood by learners, and what is aimed to be understood (Hattie & Timperley, 2007). Therefore, teachers were required to intervene through their feedback, in order to provide guidance, support, knowledge and opinions across aspects of learner events (e.g., motivation, behaviour and task success), towards what is to be understood. Research surrounding intelligence feedback and Dweck's (1999) theories of intelligence has indicated that teachers' theories may guide some feedback to students (Park et al., 2016; Rattan et al., 2012; Snyder et al., 2014; Sun, 2015). However, there are few studies, which have examined intelligence feedback and teacher beliefs of intelligence in naturalistic settings. Specific teacher intelligence feedback practices are presented in the methodology section of this thesis (Sections 3.10 and 3.11), as intelligence feedback was measured using an observation guide constructed from literature.

When referring to the English context, the Department for Education (DfE) teaching standards identify teachers should "make accurate and productive use of assessment" (Department for Education, 2017, p. 52), which includes offering feedback to students on a "regular basis"; as this is a form of assessment (ibid, 2017, p. 53). The DfE includes both oral and written feedback, which aims to provide students with the means to improve and develop existing and future work. The type of feedback suggested by the DfE, however, is non-specific, which indicates that teachers' are expected to draw upon their professional knowledge in order to feedback to students, in a way they feel most appropriate and conducive to future improvement.

Similarly, the Office for Standards in Education (OfSted) (2015), the quasi-autonomous body of school inspectors in England, have stated that schools should provide regular feedback to students, whether this is verbal or written; again, in line with their teaching responsibilities. Although a small area of OfSted's inspections, feedback is an integral part of teacher practice and a key area across English education policy. Despite importance of feedback, findings from an English online consultation among teachers (*n* = 752) which explored feedback, indicated that teachers were not confident in their use of feedback and under half of teachers in the study received feedback specific training in their initial teacher training (Millard, Small, & Menzies, 2017). Therefore integrating knowledge and beliefs into practice may not always be conductive to learning (ibid). Consequently, the research of this thesis also explored teacher beliefs about their own intelligence feedback, and how teachers interpreted their own behaviour in teaching and feedback.

Given that feedback, including intelligence feedback, is important in teaching and learning (Department for Education, 2017; OfSted, 2015) both the quality and types of feedback have implications for learners. Research has indicated that subtle linguist cues affect student motivation (Cimpian et al., 2007), whilst feedback of teachers is identified as having a causal effect of students' subsequent effort expenditure following failure (Snyder et al., 2014). Teacher intelligence belief and intelligence feedback do not always align, suggesting a more complex relationship in the actualisation of intelligence beliefs (Sun, 2015). The section that follows, explores teachers' contexts, in order to investigate beliefs and the potential role of environment, which may influence intelligence feedback.

2.5 The Role of Context in Theories of Intelligence

In Dweck's (1999) theory of intelligence model, environment and the structures of the environment are identified as developing or encouraging specific beliefs (e.g., school environments, which emphasise an incremental belief). Nonetheless, Dweck does not discuss at length the relationship of teachers' intelligence beliefs and their environments in influencing intelligence related practices, despite research suggesting environment is a key influence on teacher intelligence feedback (Rissanen et al., 2018a). Furthermore, Dweck and Molden (2007) also indicate that individuals may hold both theories (e.g., entity and incremental) and respond to primed environmental cues (e.g., learning environment created by teachers), in line with entity or incremental behaviours. Although, there is little explanation of the role of environment on mixed believers, despite recent research which, once again, reiterates the importance of context on influencing theory of intelligence enactment in the teacher population (Yeager et al., 2019). Context in teacher feedback practice may, for example, be impacted by the available schools resources. Where there are established high quality curriculums in schools (e.g., informed by teacher training and investment in teacher professional development), teachers may be primed by their environment to act in accordance with their incremental environment (ibid). Others have attempted to further understand the role of environment in teacher feedback (Rissanen et al., 2018a; Rissanen, Kuusisto, Hanhimäki, & Tirri, 2018b; Rissanen et al., 2019), although little is still understood about how environments may influence the enactment of entity or incremental behaviours, as contexts across institutions differ.

Through investigating teacher beliefs regarding context, it may be possible to identify environments which prime enactment intelligence beliefs, as well as explore how beliefs and, or context, affect intelligence feedback. Therefore, further research, which explores intelligence belief and practice, would provide an insight into teacher's teaching and the beliefs, which affect their intelligence feedback. Green (2014) has identified that much of the current literature turns attention to the role of students' environments. For example, how environments influence student beliefs and behaviours. However, given that teachers direct, manage and motivate pupil learning through feedback, it is key to explore the processes, which guide teacher decisions. Additional evidence, which focuses on teacher behaviour, would therefore assist our understanding of teacher attributions and provide an insight into teacher decision-making, which in turn may assist with increasing incremental belief socialisation (see Section 2.4).

2.6 The Inter-relations of Individuals' Wider Ecology

In order to contextualise wider teacher beliefs and practices (e.g., not only intelligence beliefs), Buehl and Beck (2014) present a model of teacher ecology, which was used to underpin this Doctoral research. Buehl and Beck's (2014) model of teacher ecology advanced thinking by adapting Bronfenbrenner's (2005) early ecological model of child development to teacher beliefs and the relationship with practice. Bronfenbrenner (2005) proposes a developmental model of children's beliefs and behaviours, which are shaped and formed as a result of external and internal processes (Figure 2.4). Within Bronfenbrenner's (2005) model, the individual is located at the centre, with various systems working in conjunction, shaping the individual's behaviour, as influenced by the developmental system.

Bronfenbrenner (ibid) proposes that children develop and are shaped by a multitude of interactive systems, such as culture, family, environment and biological factors. Each system is viewed across various layers in relation to child development. The closest inner circle system (microsystem) relates to the environment the child has most contact with such as relationships and immediate face-to-face contexts (e.g., school and family). Within the microsystem, there is also bi-directional influence, whereby the interactions between child and others can influence the behaviour of both the child and the individual in interaction with the child. The chronosystem is related directly to the individual processes, both internal and external factors across time, which may influence outcomes (e.g. cognitive processing, beliefs and biology). The mesosystem can be understood as the links within the microsystem and can be composed of two or more connections (e.g., relationship between parents and teachers). The exosystem can be viewed as the larger external context, which frames and governs the overall system, but is unreachable to the child (e.g., parental work structures). Finally, the macrosystem incorporates culture and laws, which affect all interactions across the layers and structures the function of the layers.

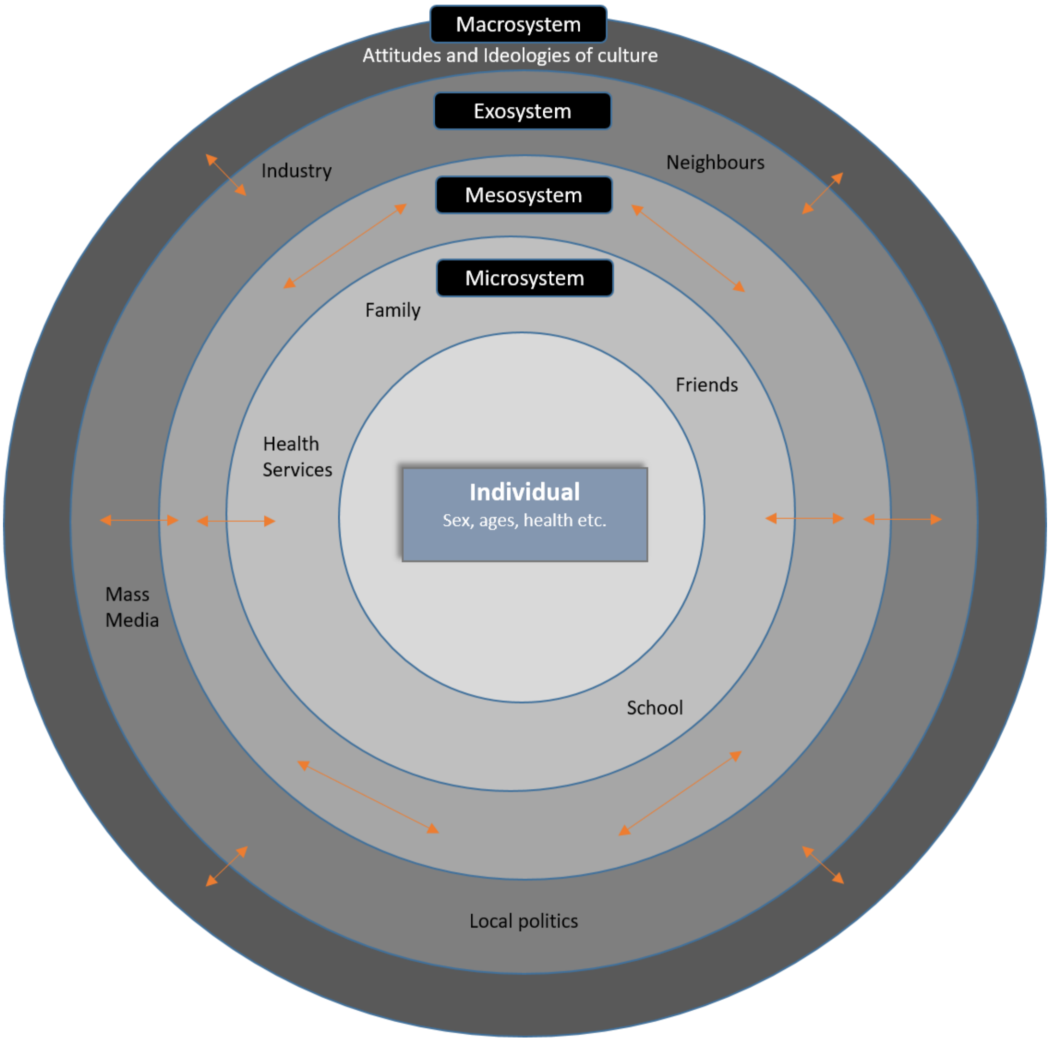

Figure 2.4 Bioecological Model of Child Development.

Each layer interacts, including across levels, rather than existing independently, creating an overall bioecological model (for full review see Edinete & Tudge, 2013). Bronfenbrenner et al. (Bronfenbrenner, 1998, 2005; Bronfenbrenner & Evans, 2000) also discuss the importance of proximal processes which occur. Proximal processes are defined as the frequent interactions and energy transfers between the individual and their context, including objects, symbols or others. These interactions in turn shape, maintain and alter beliefs or behaviours accordingly, and are consequently key in understanding the development of individuals (Bronfenbrenner, 1998; Bronfenbrenner & Evans, 2000; Darling, 2007; Edinete & Tudge, 2013).

Ecological Model of Teacher Beliefs

Buehl and Beck (2014) applied an adapted model within their work, by incorporating an ecology that identifies internal (e.g., beliefs and knowledge) and external (e.g., school context) factors that can be applied specifically to teachers. The purpose of using the model in research can assist in understanding the belief-practice relationships of teachers, which exists "within a broader multi-levelled context of various internal and external factors" (ibid, p. 74). Individual's beliefs exist in an interconnected system, where beliefs can vary in their centrality and importance (i.e., following the logic of Skott (2014), see 2.3.2). Buehl and Beck's (2014) model also resonates with earlier work of Nespor (1987), who proposed the importance of context-specific connections, in understanding the relationship of beliefs within a wider ecology. Buehl and Beck (2014) also note that although beliefs can change over time, they are relatively stable by nature, therefore aligned with current understanding of theories of intelligence (Dweck, 1999 - see Section 2.2).

Furthermore, Buehl and Beck's (2014) model takes into account earlier work by Fives and Buehl (2012), which explores the function of beliefs in filtering, framing and guiding teachers' behaviours. Fives and Buehl (2012), originally proposed beliefs filter (e.g. teachers filter information they believe to be relevant and include or exclude this), frame (e.g. how the problem, once filtered, is framed or defined) and guide (e.g. the resulting behaviour). Fives and Buehl (2012) also suggested that beliefs and practice may not align due to the varying, contrasting or conflicting beliefs and the wider complexities of belief systems. For example, a teacher may be unable to enact their belief about not issuing detentions for poor behaviour, but is required to follow school policies which dictate students must be given detentions for poor behaviour.

In light of Fives and Buehl's earlier work (2012), Buehl and Beck (2014) devised a teacher ecology, to extend previous research on teacher beliefs. The newest model (Buehl and Beck, 2014) was conceptualised through systematically reviewing literature, which identified the study and assessment of beliefs from 2008–2012. Duplicates and articles based on predetermined criteria (unlisted) were removed, providing 257 articles in total. The authors explored various research areas within the literature, including beliefs as precursors to behaviour (e.g., enactment of practice based on belief), beliefs as shaped by the engagement of specific actions and practices (e.g. professional development and success in enactment or experiences) and the misalignment of beliefs and practices, which suggests beliefs and practices may well be unrelated. From their review, the authors found that the relationship between teachers practices and beliefs is “reciprocal, but complex” (ibid, p. 70) with both belief and practice influencing one another. Thus, belief-practice variation may be a result of experience, type and function of belief (e.g. more or less related to teaching practice), context, individuals and the assessment methods of beliefs and practice. It is from their review, previous work undertaken (Fives and Buehl, 2012) and influential work of Bronfenbrenner (2005), that the authors constructed an ecological model in an attempt to further understand the relationship of beliefs and practices.

Within the teacher ecology model (Buehl & Beck, 2014), there are internal and external factors identified which either supported or hindered teachers from enacting their beliefs in practice. A summary of the factors (taken from Buehl & Beck, 2014) is provided below, while Figure 2.5 is the model proposed by Buehl and Beck (ibid):

1. **Internal: Other beliefs** – Concerned with the other types of beliefs teachers may hold, and how these may interact with their teaching practice. Other beliefs vary in their importance and can be contradictory in natural, consequently the broader belief system may or may not support the enactment of specific beliefs within the classroom.
2. **Internal: Knowledge** – This relates to both subject knowledge and pedagogical knowledge, and the enactment of beliefs in relation to these. If a teacher believes they do not possess a sufficient amount of knowledge with respect to a specific domain, they are unlikely to act in accordance with their belief. For example, a teacher may hold a belief about the positive benefits of pedagogical theory however, due to a lack of knowledge, may be unable to enact this within their own teaching.
3. **Internal: Self-awareness and Self-reflection** – Teachers’ degree of self-awareness and self-reflection determine the congruence of beliefs and enactment. If a teacher lacks self-awareness or self-reflection, they are more likely to display behaviours, which are misaligned with their beliefs. Those teachers, whom are engaged, are said to consequently hold a more coherent belief system.
4. **External: Classroom-context Factors** – These include factors which are present in the immediate environment such as student ability, student attitude, classroom management and class size; which can hinder the enactment of beliefs (e.g., large class

size causes teacher to perceive less time is available for individuals, therefore belief of students receiving more one-to-one time cannot be enacted). Buehl & Beck (2014) note that barriers can be overcome through the identification of strategies; however, teachers are likely to report difficulties in enacting their beliefs if the classroom-context factors are high.

5. **External: School-context factors** – Similarly, school-context factors are specific to teachers' immediate working environment, in that the support of colleagues, parents and administration can impact on the enactment of beliefs. Here, teachers' perceptions of potential barriers are important, as systems to support staff may be in place. However, teachers may perceive these as unsupportive and thus are unable to align beliefs and practices. In addition to this, school culture, community and ethos are encompassed within school-context factors, including collective beliefs of staff and students (e.g., beliefs held by groups of individuals in the same context).
6. **External: National-, state- and district-level factors** – These factors are concerned with the broader state of education, governed external to the immediate context. This includes policies and curriculum standards, which dictate pedagogy. Consequently, this may cause teachers to enact behaviours, which are incongruent to their beliefs. (e.g., teaching a specific aspect of curriculum which a teacher believes is unnecessary or irrelevant). Note, the literature references the American Education system, adaptations to the English context are provided and applied in the discussion section (Chapter 5).

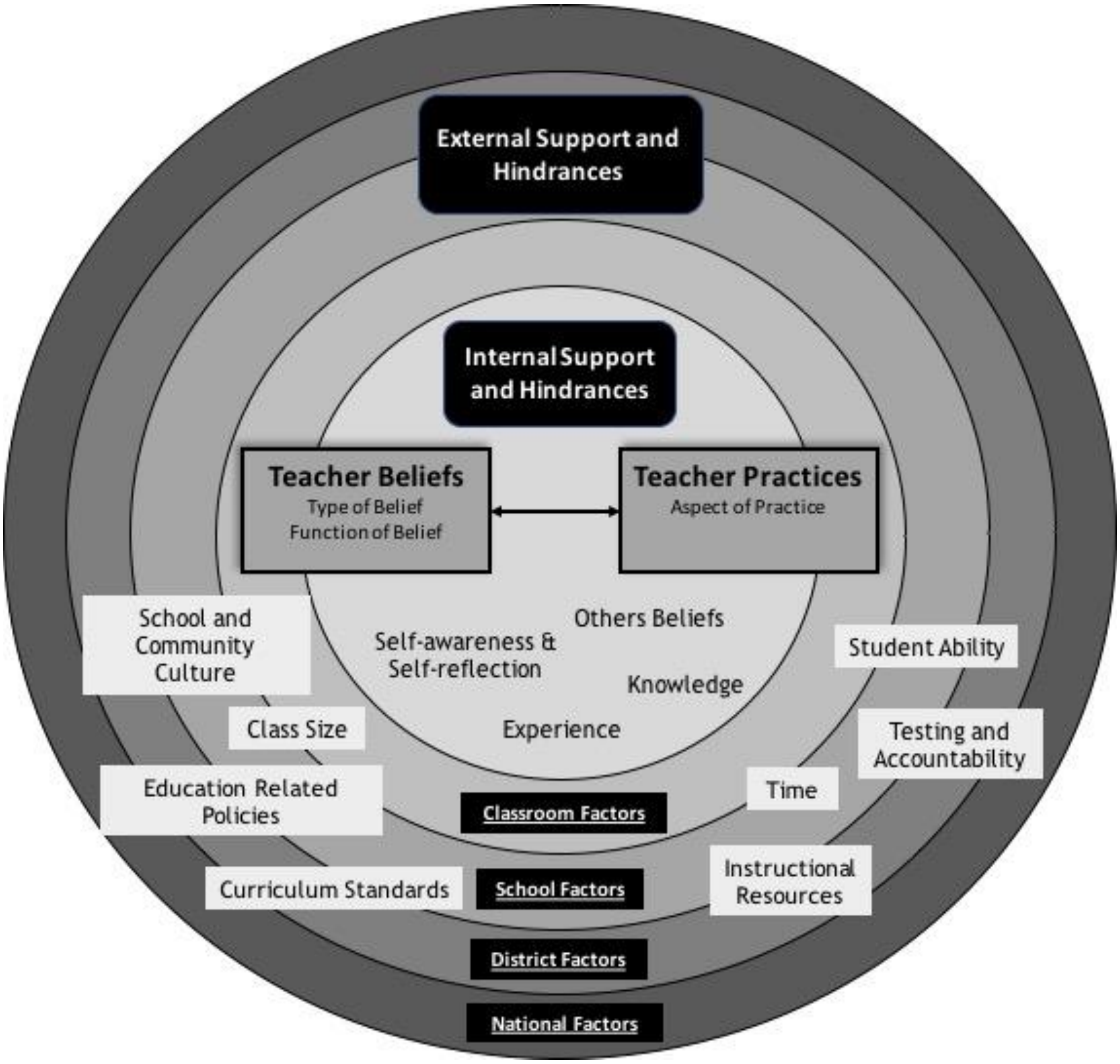

Figure 2.5 Buehl & Beck's (2014) Teacher Ecology.

Buehl & Beck (2014) suggest that viewing teacher beliefs and practices in an ecological model can assist in understanding the alignment or misalignment of belief-practice. In light of their model, the authors, Buehl & Beck, suggest that more research is needed in order to fully explore the ecology; as a multitude of factors influence different beliefs and practice. Through the lens of teacher ecology, it is possible to view a mechanism of belief-practice, which can account for inconsistencies of belief-practice alignment (ibid). For example, the role of teachers' immediate school context affecting belief enactment. The ecology model (ibid) may further assist with understanding some of the inconsistences reported in non-alignment of teacher intelligence beliefs and intelligence feedback (Rissanen et al., 2018a; Song, 2018; Sun, 2015). The aim of presenting Buehl and Beck's (ibid) model within the current Doctoral study is to provide an analytical tool to further understand teacher's intelligence belief and intelligence feedback practices, as embedded within their school context and larger environment, including educational policy.

Early Conceptions of Belief and Environment

The work of Bronfenbrenner (1998) and Fives and Buehl (2012) across ecological models is related to the early work of Rokeach (1969). Rokeach's (1969) work encompasses belief, attitudes and values, and the importance of these to individuals when attempting to persuade a change in behaviour. Rokeach (ibid) also proposes belief systems are central to an individual's sense of identity, formed through environmental factors, and that beliefs vary in their depth and organisation. Beliefs allow an individual to maintain a sense of self both individually and collectively in wider society. As previously stated (Section 2.3), beliefs are described by Rokeach as "any simple proposition, conscious or unconscious, inferred from what a person says or does" (1969, p. 113), suggesting beliefs can be explicit or implicit in nature. Within Rokeach's system, the importance of a single belief can be understood in relation to the other beliefs held by an individual and the connectedness of a belief in relation to self.

According to Rokeach (1969), there are five variants of beliefs, which differ in their importance and centrality. Beginning with the most central, Type A beliefs are primitive by nature and require social consensus (e.g. I believe this is a table). Type B beliefs are primitive beliefs to oneself, however do not require social consensus and arise from self-realisation (e.g. I believe I am stupid). Type C are identified as authority beliefs, which develop from Type A beliefs, however these are referenced to people and positive or negative authority of individuals according to oneself (e.g. parents are main authority figures to children, this gradually expands over time and exposure to other adults). Type D beliefs are derived and held as matters of fact as the source is trusted (e.g. group identity, institutionalised ideology). Finally, the beliefs, which are furthest from centrality, are Type E or inconsequential beliefs, which can be described as matters of preference. The maintenance of these beliefs does not require social consensus and change to these beliefs has little impact on the structures within the overall belief system. Consequently, the stability of belief types can vary dependant on their positioning (e.g., A, B, C, D or E), however a change in the most central beliefs, Type A, alter the entire system (e.g., beliefs which are facts to the individual).

Rokeach's (1969) work therefore also underpins the Buehl & Beck (2014) bioecological model, where teachers are placed in a central system. Rather than focus on the formation of individuals beliefs only, Buehl and Beck (2014) consider the wider environment in more detail and the shaping of behaviour and teacher practice in relation to beliefs. The research in this Doctoral thesis therefore also draws upon the differing centrality of beliefs, in order to better understand the formation, stability and enactment of beliefs. However, it is key to note, this PhD study is not concerned with altering teacher belief of intelligence. Rather, the Doctoral thesis draws upon previous studies which have examined the role of beliefs and why teacher beliefs are a key factor in practice. Furthermore, the literature review aims to provide a background of knowledge for understanding.

2.7 Teachers Roles and Pedagogy in the UK

Considering teachers roles as educators, as contextualised by the English educational system, is fundamental in understanding the nature of the belief-practice relationship. Context should be a large consideration in educational research, as it is key to provide an overview of political and cultural differences, which may govern practice (see Rissanen et al., 2018a; Rissanen et al., 2019). Particularly as professional obligations as an educator, which are policy bound (e.g., results accountability), may alter behaviour (Buehl & Beck, 2014). For instance, teachers holding strong beliefs about their role to maintain student engagement and maximise learning, affects lesson planning, alters focus on task choice and use of novel teaching strategies (Tadich, Deed, Campbell, & Prain, 2007). In addition, research indicates that it is teachers who foster and maintain student motivation within the classroom, through the choice of pedagogy (e.g., academic tasks, novel teaching and assessment) (Anderman & Gray, 2017; Dweck et al., 2017; Hattie, 2012). Therefore, context affects various aspects of teachers' pedagogy (Buehl & Beck, 2014).

In England, teaching professionals in Primary to Secondary education (ages 4 – 16) are required to abide by and follow criteria which underpins their responsibilities as a teacher, whilst defining duties, values and morals teachers' must enact. It is the DfE in England, who are responsible for children's education in England, identifying the role of teachers. The DfE (2017) outlines that teachers are responsible for various teaching and learning duties, including: monitoring progress, lesson planning and reporting on students' academic achievement. The aim of their duties is to ensure student academic improvement over time. Additionally, the DfE (2017) provides basic standards to guide teacher practice and training, whilst underpinning teachers' pay progression. Teaching standards include detailed criteria and good practice guidance on various areas, such as Teaching Standard 2 (TS2) which states teachers must "promote good progress and outcomes by pupils" (ibid, p. 51), (TS4) "plan and teach well-structured lessons" (ibid, p. 52) and (TS7) "Manage behaviour effectively to ensure a good and safe learning environment" (p. 53). Part two of the English teaching standards includes personal and professional conduct, which summarises additional requirements of teachers in their roles. For example, "teachers must have proper and professional regard for the ethos, policies and practices of the school in which they teach", "treating pupils with dignity, building relationships rooted in mutual respect" and "having regard for the need to safeguard pupils' well-being" (Department for Education, 2011, p. 14). Identifying the teaching standards and personal and professional conduct, as outlined by the DfE (ibid), contextualises teacher's roles and pedagogy in England, where this Doctoral study was undertaken. In accordance with the descriptions outlined by the DfE (2011), teachers are accountable for the development, achievement and support of both students' academic and wider outcomes (e.g., emotional well-being, community values and social skills).

Competence

Anderman and Gray (2017), suggest teachers are responsible facilitating "the development of competence motivation" (p. 613). "Competence" in Anderman and Gray's (ibid) work is argued as a more suitable term, in opposition to 'achievement', as teachers are required to foster competence in a range of domains (e.g., social-skills, well-being and academic outcomes). Furthermore, competence is expressed as the "conceptual core" (Dweck et al., 2017, p. 3) in relation to achievement motivation (e.g., individuals' perceived ability to achieve and demonstrate ability). Although manifestations of competence differ across lifespan, including domain specific competence which can be academic or social (Cook & Artino, 2016; Dweck & Elliot, 2007).

Dweck and Elliot (2007) also propose "achievement" is replaced with "competence", in order to present a clearer definition of an all-encompassing learner motivation, which is reflected in the English teaching standards. Consequently, achievement can be recognised as the subjective value of an attained result and an individual's motivations, responses and competence demonstrations to attaining that result. Therefore, regardless of school or policy (e.g., external factors) which may dictate teacher practice (e.g., school setting, class setting, geographic) teachers play an integral role in the development of both their students competence and their own competence, through the teaching practices they provide (e.g., feedback and behaviours).

In a review of motivational interventions, Lin-Siegler, Dweck and Cohen (2016) point towards a range of additional factors which may influence students' competence outcomes, including school environment, home environment, school quality, as well as teachers (p. 295). This is reiterated in Anderman and Gray's (2017) review of research into the roles of schools and teachers in fostering competence motivation. The review concludes, "teachers can greatly influence motivation" (p. 615) through their interpersonal contexts (e.g., student-teacher interactions) alongside these other complex considerations (e.g., institutional, national and classroom factors). Furthermore, in a meta-analysis of 931 studies, Hattie (2012) measured effect sizes on learning in order to determine the impact of core attributions to students' learning. From the analysis Hattie noted that "the greatest source of variance in our [educational] system relates to teachers" (p. 18), however it is "teachers [who] are among the most powerful influences in learning" (p. 22). According to Hattie, for learning to be successful teachers must welcome errors and be prepared to "learn, re-learn and explore knowledge and understanding" (ibid) in relation to their practice. Other research draws parallels with this in recognising the significance of developing the necessary skills for life-long learning, where individuals face challenges and setbacks in relation to various learning environments (Dupeyrat & Mariné, 2005; Dweck, 2010; Dweck & Bempechat, 1983; Haimovitz et al., 2011; McWilliam & Haukka, 2008).

The role of competence and motivation is an important consideration to note in this Doctoral study, as teacher theories of intelligence are a multifaceted and complex construct. For instance, the interactions of context (e.g., school ethos as well as wider culture), individual's intrinsic beliefs of competence and the motivational factors in achievement settings, affect competence (see Section 2.6). This can include, teacher beliefs about their own competence as educators, definitions of intelligence, beliefs about student intelligence, school ethos and their enactment of their roles. Overall, it is difficult to exclude or separate individual elements of a teacher belief systems and external contexts, as both are influenced by and influence practice (see Section 2.6). However, using specific methodologies (Chapter 3), application of theories, and careful dissemination, it is possible to narrow focus to individual belief concepts (e.g., intelligence beliefs) and practice (e.g., intelligence feedback), in attempt to better understand teachers' in-situ decision making. On the whole, the current Doctoral research was concerned with the intelligence beliefs of teachers, intelligence feedback and role of teacher environment. As well as how teacher environments may or may not be related to feedback practice and the contextual interactions of intelligence beliefs-practice.

2.8 Educational Context

Given that this research study is set within secondary schools in England, the following section provides an overview of key reports and literature, which outline the educational system in England throughout the undertaking of this PhD study. The following section does not discuss the historical context of the secondary education system, as the development of schools was not a key area of focus in this thesis. Instead, this section outlines the Secondary education context of England.

Secondary School Structure and School Types in England

In 2019, the Department for Education reported that there were 3,408 secondary schools in England, with 203,686 full time secondary school teachers employed in England in 2018 (state funded) (British Educational Suppliers Association, 2019; Department for Education, 2019c). Pupils in secondary schools are aged 11 – 16. Pupils from ages 11 - 14 follow the national curriculum, before undertaking exams and coursework to attain General Certificates of Secondary Education (GCSE) in chosen and core subjects (English, Maths and Science).

Secondary schools and funding vary dependant on the type of school. In state schools, funding is determined by the local authority and they are required to follow the national curriculum (UK Schools and Education, 2020). In academy schools, which are also state schools, funding is directly distributed to schools from central government and independent schools are privately funded (e.g., charge fees to attend) (ibid). Free schools, Academy and independent schools have the freedom to choose some aspects of their curriculum, term dates and set out teacher pay-scales, however there are compulsory state regulations (e.g., exclusions, safe guarding and special education needs provision) (ibid). Compulsory state regulations include the further training of teachers once qualified (e.g., INSET and Continued Professional Development), in accordance with the teaching standards.

Initial Teaching Training and Teacher Standards in England

It is the Department for Education who set out statutory requirements for schools and teachers' professional standards, which all teachers in maintained schools are required to follow as part of their roles. Underpinning pedagogy are 8 teacher standards (Part 1) and teacher professionalism (Part 2), which guide initial teacher training (ITT) and instruction, newly qualified teachers, and teachers following training (Department for Education, 2011).

Teachers are expected to demonstrate a high standard of personal and professional conduct, with statements defining standards of behaviour and attitudes across teachers' careers. Including "teachers must have proper and professional regard for the ethos, policies and practices of the school in which they teach" and "not undermining fundamental British values, including democracy, the rule of law, individual liberty and mutual respect, and tolerance of those with different faiths and beliefs" (Department for Education, 2011, p.14). Therefore, the statements set out in the teacher standards are wider job descriptions and expectations. Specific duties and roles within individual schools may vary dependant on location, level or responsibility, age groups taught and schools processes and procedures.

Training of teachers in England is undertaken through various programmes, a selection including schools direct programmes, School-centred initial teacher training (SCITT) , teacher first programmes and undergraduate degree programmes with qualified teacher status (Department for Education, 2019a). Some trainee teachers are provided with a cash incentive, dependant on the priority of the subject (e.g. sciences). As part of teacher training, trainee teachers are required to demonstrate their competencies in the teacher standards, evidenced through in school observations and training, as well as theoretical underpinnings for pedagogy. Furthermore, teachers are both judged and rewarded based on performance, for example students' exam results and focusing on areas to raise their teaching standards.

Curriculum and Exams

In State school Secondary education, subjects are underpinned by a statutory national curriculum, which concludes with exams following 5 years of education (ages 11 – 16) (Department for Education, 2019d). General Certificate of Secondary Education (GCSEs) exams are undertaken at the end of Year 11 (age 15 – 16), which are high-stakes exams before compulsory Further Education (ages 16 – 18). Across all GCSE subjects, teachers follow specifications in line with awarding body requirements. While subject awarding bodies differ in their specifications and content, all GCSE students result in a grade from 1-9 for each (e.g., 9 is the highest result/achievement, and 1 is the lowest). The DfE introduced reforms from 2015 to GCSEs to provide greater results differentiation in schools, assessment primarily through exams (as opposed to coursework) and include more demanding content (Ofqual, 2018). Reforms also included changes to the grading system from 1 – 9, therefore a wider spread of results between the highest and lowest achievers, as well as the introduction of new specifications and the removal of lower tiered papers. Previously, there were higher and lower paper options for students, dependant on ability, which allowed for less or more challenging work (ibid).

Judgement and Inspection of schools

As briefly outlined in Section 2.4, schools are judged and accountable on their overall quality of education which is regulated by the Office for Standards in Education, Children's Services and Skills (OfSted). OfSted are responsible for inspecting, regulating, and reporting on schools' performance, to inform parents and provide accountability (OFSTED, 2019). OfSted has a number of inspection criteria, taking into consideration student behaviour, attitudes, learning and personal development, teaching, leadership and overall school management (ibid). Quality of education provided by schools is judged on intent, implementation and impact of the curriculum, while individual teachers are not graded, rather school provision as a whole. As a result of inspections, schools are rated as: inadequate, requires improvement, good or outstanding, with each result holding implications for future inspections (e.g., more frequent inspections for 'requires improvement' school and less frequent for 'outstanding' school). Inspections are high-stakes for schools as ratings indicate the overall effectiveness of a school, which is important for staff recruitment and retention and improvement (Department for Education, 2019e).

2.9 Nuances and Limitations of Implicit Theories of Intelligence

The final section of Chapter 2 presents the nuances and limitations, which exist in the extant literature on theories of intelligence conceptualisation. Literature across Chapter 2 has highlighted some limitations in theories of intelligence; however, this section is dedicated to further explore conceptual issues. The aim is to provide further conceptual depth and explore underlying questions, which arose across the literature review. Section 2.9 is also presented towards the end of the literature review as the chosen methodology were underpinned by the limitations outlined. Further details of how the nuances and limitations in the theories of intelligence literature were addressed in this Doctoral study are provided in Chapter 3.

Intelligence

Within her work, Dweck (1999) proposes definitions of intelligence vary across culture and domain of study (e.g., intelligence as a function, measurement through IQ, combination of personality and intellectual functioning). However, intelligence is not defined within theories of intelligence literature. Other researchers have critiqued the lack of definition, due to variation in individuals' concept of intelligence (Lüftenegger & Chen, 2017). Adding further difficulties, Dweck (ibid) also identifies that individuals have their own unique conceptions of intelligence, but uses self-reports on an individuals' implicit theory of intelligence as a global measure of intelligence (see Section 2.2).

In unpublished work, Dweck and Muller (1997) sought to explore definitions of intelligence associated with implicit theories. According to the authors, entity theorists were more concerned with inherent capacity or potential (e.g., inborn ability to learn and evaluate). While data indicated incremental theorists defined intelligence as knowledge and effort (e.g., someone who knows how to work hard). Although some research exists in defining intelligence in implicit theories, there is limited research, which underpins the self-construct of intelligence. As theories of intelligence are proposed as both a self-theory (e.g., individual) and global measure of intelligence (e.g., collective), this poses issues for understanding conceptualisations of intelligence, as the definition of intelligence may vary between individuals. Further discussion and attempts to understand teacher concepts of intelligence in the current Doctoral study were therefore attempted, and achieved, through collecting data on individual's definitions of intelligence (discussed in Section 6.1.4).

Implicit or Explicit

Further to the terminology used across theories of intelligence, there are also conceptual issues with the use of 'implicit'. According to Dweck (1999), implicit beliefs of intelligence guide behaviour, and individuals are unaware of these beliefs. The common measurement across implicit theories of intelligence, however, makes use of a self-report for teachers.

Again, beliefs, which are truly implicit in social cognition, would not be accessible through direct questioning, as individuals cannot access or describe implicit beliefs. Thus, the argument here is that the use of implicit appears to be generally inappropriate. Either implicit theories of intelligence cannot be accessed through self-reports, as they are implicit, or theories of intelligence can be accessed, as they are lay theories about the nature of intelligence and hence not implicit (Lüftenegger & Chen, 2017).

Consequently, given individuals can report their beliefs of intelligence, this Doctoral thesis proposes theories of intelligence can be accessed by individuals, therefore not implicit. Theories of intelligence may exist and affect behaviour, undeliberated by the individual, however can be accessed through direct questioning and reflection. In accordance with previous literature and understanding (Section 2.3), which indicates a belief can be inferred or understood through behaviour or language, preceded by the phrase 'I believe that . . .'" (Rokeach, 1969), theories of intelligence are therefore explicit. Given the nuances with both terms and implications of 'implicit', across the rest of this thesis the decision was made by the researcher to refer to 'implicit theories of intelligence', simply as 'theories of intelligence' when referring the full title. Avoiding the use of implicit removed any potential issues with terminology and understanding when presenting findings and discussing the nature of teacher beliefs.

Overreliance on self-reports

Historically, implicit beliefs of intelligence are measured on a self-report (Dweck, 1999). The use of self-reports is a useful starting point for providing a general overview of beliefs in populations, while also a quick tool to assess beliefs (Dweck, 1999). However, given the rise in theory of intelligence interventions in schools and teacher awareness of the theory, self-measures may lead to teachers reporting socially desirable outcomes (Hoffman & Seidel, 2014; Schmidt, 2015; Yu, 2017). Self-reporting socially desired outcomes are when individuals are more likely to report an incremental theory of intelligence, due to heightened awareness of the reported benefits of holding an incremental theory of intelligence. Researchers have suggested that in the teacher population we need to consider alternatives to the commonly applied self-measures (Schmidt, 2015).

Consequently, the intelligence beliefs discussed throughout this research were accessed through asking teachers to both self-report and verbalise their beliefs (Dweck, 1999;

Lüftenegger & Chen, 2017; Pajares, 1992) (see Section 3.4). The aim of using self-reports and direct questioning were to explore both the degree of congruence between stated and self-reported beliefs, as well as exploring teacher conceptualisations of their intelligence beliefs. Self-reports and the conceptualisation of intelligence through interview questioning, would assist with further understanding teachers self-reporting sociably desired outcomes.

Context

The final limitation, which is prevalent across research, is the lack of consideration to the role of context on the enactment of theories of intelligence, as previously discussed in Section 2.5. Recent data indicates some students groups may be more susceptible to the positive effects of endorsing an incremental theory of intelligence (e.g., low socio-economic status students) (Claro et al., 2016; Rienzo, 2015; Yeager et al., 2019). More specifically and applicable to the participants of the current Doctoral study, research indicates context shapes both the beliefs and enactment of teacher practice (Buehl & Beck, 2014). Whilst, in relation to theories of intelligence, emergent research indicates context also affects teacher-student feedback (Rissanen et al., 2019). Thus, in order to better understand teacher enactment of theories of intelligence, which can affect student motivation (Haimovitz & Dweck, 2017; Park et al., 2016), context is a key area of focus – which limited literature accounts for.

2.10 Summary

Reviewing the literature for this Doctoral study, it is apparent there is a large body of work, which underpins teacher and learner theories of intelligence. There are also many areas of research, which overlap and add complexity to concepts and terms. For example, belief research (Fives & Gill, 2014a; Kagan, 1992; Pajares, 1992; Rokeach, 1969), teacher ecology (Buehl & Beck, 2014) and mixed-results from interventions (Foliano et al., 2019; Rienzo et al., 2015). Although vast, these research areas provide both a theoretical foundation for the current Doctoral research, as well as addressing recommendations for studying teacher's theories of intelligence (e.g., Haimovitz & Dweck, 2017; Rissanen et al., 2018; Yeager & Dweck, 2019). In particular, through the use of empirical methods, which employ in-situ study of teacher intelligence feedback. The research of this PhD study therefore aims to further knowledge through providing additional evidence and contextualising research in the English Secondary school setting. As well as exploring the role of context on the actualisation of teachers intelligence beliefs. The following section, therefore, outlines the chosen methodologies used in order to further explore teacher intelligence beliefs and teachers intelligence feedback.

Chapter 3

Methodology

3.1 Introduction

Chapter 3 discusses the methodology chosen to undertake the study. This Chapter includes the philosophical underpinnings of the research, rationalisation of methods, and highlight the strengths and limitations of the research design. The methods section covers chosen tools for data collection, including questionnaires (Section 3.8), observations (Section 3.9) and semi-structure interviews (Section 3.12). Methods were designed to answer research questions (see Section 1.2), and analysed in a phase one approach (see Section 3.14.1). The research design also included a phase two analytic approach, separate from the research questions, which generated theory presented in Chapter 6 (discussed in Section 3.14). Thematic analysis (Section 3.14.1) and abbreviated grounded theory (Section 3.14.2) were used to analyse data. In addition to the methods, the ethics of this Doctoral research are also presented (see Section 3.3), as well as an outline of the pilot study (Section 3.5) and recruitment (Section 3.6). To begin this chapter, details of researcher positioning are discussed.

3.2 Research Positioning

Methodology encompasses various elements, including the theory of research methods chosen, philosophical assumptions and decision-making in light of chosen methods (e.g., approach to data collection methods and analysis). According to Basit (2010) the aim of methodology is to select appropriate methods which create reliable and valid knowledge, unique to the research. Punch (2011) notes that method choices are based on individual's underlying assumptions about the nature of reality, knowledge of that reality and the most appropriate ways to construct knowledge of that reality (e.g., researcher's positioning, see Section 3.2.1). As methodology underpins the research process, from the selection of methods to the analysis of data which follows, research position is important; particularly as each research decision in research is interwoven with the research philosophical positioning (Burton, 2009; Check, 2012). Through the identification of researcher positioning, it is possible to better understand how assumptions about the nature of reality and knowledge relate to methods selected and the wider implications on research (e.g., method selection, data analysis and theory generation) (Crotty, 1998).

Ontological, Epistemological and Axiological Assumptions

In the selection of methods there are key paradigms which underpin the research process, embedded in the researcher's ontological, epistemological and axiological assumptions, thus guiding research decisions (Basit, 2010). In its most basic form, ontology is ones idea of how the world exists, what is real and how we see ourselves within the world (Basit, 2010; Burton, 2009). For example, individuals can believe that the world is constructed as fixed and clear, existing collectively as a society. As opposed to fluid, subjective and different for every individual (ibid.). Epistemology builds on this and is concerned with the methods and proof which form knowledge and an individual's view of whether knowledge is "legitimate" (Burton, 2009, p. 17), or not, based on this evidence. Finally, axiology is based on assumptions concerned with the nature of values and can lead an individual to make judgements on their values (Bryman, 2012). Ontological, epistemological and axiological assumptions are described as implicit, in that they are rarely consciously considered. However, all assumptions can be made explicit through careful thought and research to underpin thinking and support decisions (Punch, 2011). Explicit consideration and discussion provides justification of choices and a foundation for the reader, in relation to the researcher's decision making process (ibid). Many different paradigms of ontology, epistemology and axiology exist, however, it is beyond the scope of this Doctoral research to discuss all paradigms. The section below therefore presents the researcher's positioning in this study.

3.2.1 Researcher Positioning: Critical Realism

Within this thesis, critical realism drives the researcher's understanding and research decisions. The researcher ascribed to ontological realism, epistemology relativism and judgmental rationality (e.g., also described as axiology, specific to critical realist lens) (Raduescu & Vessey, 2009). Critical realist ontology acknowledges that there can be multiple ways to understand reality, with reality also existing external to subjective consciousness. Critical realism describes research evidence as one way of knowing reality, rather than directly reflecting reality - as commonly argued by positivists (e.g., evidence is fact; Bryman, 2012). The epistemology of critical realism is understood as subjective, while the achievement of 'true objectivity' is denied (Blaikie, 2003; Maxwell, 2011). In short, complete removal from prior background, assumptions and knowledge is not possible according to critical realists. Although attempts to establish objectivity in research can be made through research design. Such attempts can create a degree of objectivity, for example, using a framework to guide observations (see observation categorisation, discussed in 3.3.7).

Judgemental rationality is also a consideration of critical realists. Judgemental rationality pertains to an individual's ability to make logical judgments about theories, in order to determine the effectiveness of theories and if modification or new theories are necessary (Raduescu & Vessey, 2009). Consequently, critical realists both accept and acknowledge that one understanding and representation of reality may be temporary and subject to change or alteration with new understanding. Critical realist thinking opposes direct realists of reality representation, ascribing to a more singular understanding. For example, direct realists ascribe to the understanding that only phenomenon which can be seen is true and commonly only focus on the group under investigation (e.g., organisation, group of people or individual – rather than the whole). In accordance with Bhaskar (2008) and critical realism, to understand reality we must identify structures, events and discourses which occur through a multi-level (e.g., context specific, cultural structures, phenomenon and individuals) approach in both practical and theoretical work.

Three Domains: Real, Actual & Empirical

Critical realists understand ontological events through the three domains of the real, actual and empirical. There are event characteristics which can occur in each of the three domains, although overlapping and related (Figure 3.1). Applying this ontology, causal mechanisms can be explored through the three domains. The domain of the empirical is related to experiences of individuals, which can be observed by others and experienced. The actual domain can be both observed and unobserved, with the unobservable found in the mechanisms of the belief system which cause events and behaviour (e.g., teachers' beliefs on practice). While the domain of the real pertains to the structures (e.g., context) and mechanisms (e.g., belief framing behaviour) that can generate events. The layered approach of real, actual and empirical is termed an "ontological depth" (Blaikie, 2007, p. 84). Ontological depth references the continuous change in the domains of the actual and real, which are subject to contextual differences. The critical realist understanding therefore provides researchers with means to go beyond empirically observed events, as some events may only be actualised dependent on other factors, such as the individual, prior events and context (Raduescu & Vessey, 2009).

Approaching research through a critical realist lens allows for understanding events which may not be predictable but observable, for example, behaviour. Behaviour of individuals can be explained by understanding individual parts of behaviour, such as beliefs and knowledge.

However, an understanding of the parts (e.g., beliefs and prior knowledge) does not guarantee predictable behaviour, as individuals can act with agency (Elder-Vass, 2012).

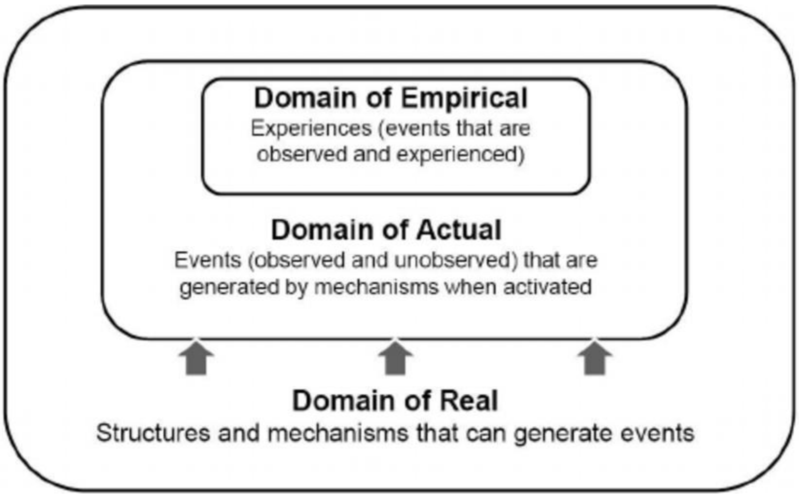

Figure 3.1 Three Domains: Critical Realist Ontology

It has been argued that critical realism can also be combined with social constructionism, through recognising “language, discourse and culture as products of interacting causal powers” (Elder-Vass, 2012, p. 12). Accounting for social structures, Elder-Vass (2012) identifies that norm circles exist, which are defined as groups of people responsible for the endorsement and enforcements of specific norms of the group. Take, for example, teachers, who are commonly responsible for the enforcement of school rules, ethos and applying school and national policy, in accordance with teaching standards (Department for Education, 2017). Usually, norm circles are committed to rules and individuals tend to act within these rules, because the pressure from norm circles leads them to comply (ibid). Individuals only tend to act in conformity because other causal powers affect them (e.g., other norms, prior decisions and beliefs). Despite a tendency to act within norm circles, transgression and change are still possible, whether intended or not, because there are other social forces that influence behaviour. For example, prior practice of teachers can influence future practice (Buehl & Beck, 2014), but consistency depends on the existence and group of people with systematically similar normative commitments.

A further element of critical realism that is considered vital to this study, is the notion of causality. Events (e.g., behaviours), according to critical realists, are caused by multiple interactions (e.g., context, beliefs, knowledge, others), therefore regularities from events are rarely produced (Elder-Vass, 2012). Rather, it is the combination of individual parts, or causations, which produce the conditions for an outcome. Critical realism, therefore, accepts that theories of mechanisms do not always need observable measurement in the "actual" or "empirical", as outcomes of mechanisms can be observable rather than the mechanism itself. Influencing outcomes and mechanisms, framed by critical realism, is the consideration of context in explanations. Context assists with our understanding of the conditions of a causal mechanism, by highlighting conditions that may "prompt or impede the operation of the causal mechanism" (Bryman, 2012, p. 29).

Overall, the three domains of Figure 3.1 were referenced to guide the methods of the current PhD thesis (e.g., self-reports, video recorded observations and semi-structured interviews with stimulated recall). Methods of the PhD study aimed to capture the subjectivity of each individual participant, as per the domains of the empirical and actual. The empirical domain was linked to the capturing of observable events (as per model 3.1), through video recorded observations. The actual domain was captured through semi-structured interviews, providing the opportunity for teacher participants to disclose attributions for their behaviour (e.g., not possible to collect via video recorded observations). The analysis of data then informed a representation of the real, where findings were presented (Chapter 5) and potential mechanisms of belief-practice alignment explored (Chapter 6). The Critical Realist Ontology model of three domains (Raduescu & Vessey, 2009 – Figure 3.1) also prompted further considerations as to how to account for the researchers own subjectivity when making attempts to capture each domain (see Section 3.2.2 for reflexive statement) and guided decision making. For example, the researcher chose to include observation guide (Section 3.9), to off-set previous experience and provide rigour in research (Section 3.13).

Pawson & Tilley Realist Ontology

A model to aid understanding of context is presented by Pawson and Tilly (1997). The positioning of Pawson and Tilly (1997) falls within a realist approach. Within their work, Pawson and Tilly focus on mechanism (M), context (C) and outcome patterns (O). Mechanisms refer to an underlying cause which generates an outcome, context refers to the conditions in which the mechanisms function and outcome patterns are the effects of the mechanism triggered in context. The model below (Figure 3.2) can be used to assist with understanding the mechanism which may result in the outcome.

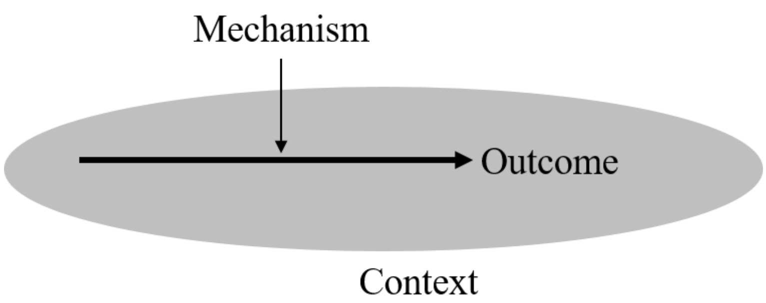

Figure 3.2 Pawson and Tilly's Realist Ontology

Applying Pawson & Tilly's (1997) model to this Doctoral thesis, the outcome is identified as teacher intelligence feedback, which includes, but is not limited to, the use of praise, challenge and motivation (see Section 2.4). A belief (e.g., intelligence belief) could be argued as a mechanism, as a belief is within Pawson and Tilly's (1997) reasoning can drive the outcome, such as teacher intelligence feedback. However, the mechanism (e.g., intelligence belief) can also be affected by context (e.g., school and students). Mechanisms include the social context, as identified previously, through the norm circles of Elder-Vass (2012). Consequently, what may be true in one context, may not be applicable or seen in another context – as context, including norm circles, can affect the mechanism, and thus the outcome. When applying a critical realist philosophy to the current Doctoral research, we are attempting to understand the role of intelligence beliefs (M), on practice (O), which may be contingent and conditional on the school context or multiple contexts.

Given the nature of belief-practice relationship (e.g., intelligence belief-intelligence feedback), belief and practice are, arguably, circular mechanisms. For example, the belief causes the practice, while the practice can also cause the belief, and therefore full circle. This is highlighted by Buehl & Beck (2014), where it is identified that beliefs and practice are reciprocal, complex and vary across individuals and contexts. At present, according to Haimovitz and Dweck (2017) the causal mechanisms behind teacher intelligence feedback, and subsequent socialisation of intelligence beliefs occur because of teacher beliefs of motivation, theory of intelligence or a combination of both (see Sections 2.2.2 and 2.7). It is through viewing belief-practice relationships through a critical realist lens that provides new models thinking to this Doctoral research, notably through the wider consideration of context. In light of both the reciprocal relationship of belief and practice, as discussed by

Buehl & Beck (2014) and the realist explanations of Pawson & Tilley (1997), a model which represents the logic within this research, as aligned with realism, is provided in Figure 3.3.

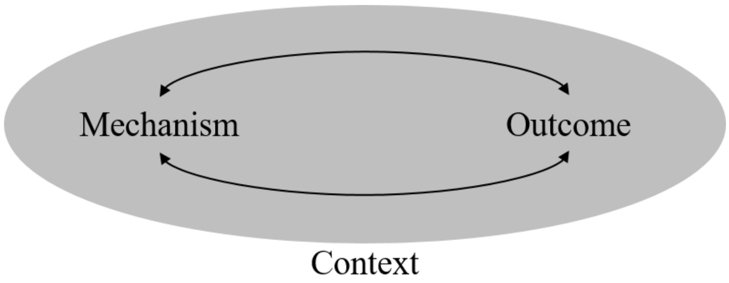

Figure 3.3 Realist Ontology Model Applied to Doctoral Research

To summarise, critical realism is used within this study to provide a basis for understanding, interpretation and presentation of findings. By aligning with the critical realist approach to the research, particularly in the context of school settings, the aim was to assist with the readers understanding across the researcher's decision-making and conclusions.

3.2.2 Reflexive and Reflective Research

Given the researcher positioning, as critical realist, it is important to consider the personal influences an individual brings to research and recognise how these can affect the research process. If left unexplored and unaccounted for, research decisions may be unjustified or poorly presented (Alvesson & Skoldberg, 2009). Influence and subjectivity closely relate to critical realism, as critical realism positioning ascribes to subjective understanding, framed by social constructionism in this Doctoral thesis. In an attempt to address influence and subjectivity, however, researchers can also endeavour to be reflexive.

A reflexive approach to the research draws "attention to the complex relationship between the processes of knowledge production and the various contexts of such processes, as well as the involvement of the knowledge producer" (Alvesson & Skoldberg, 2009, p. 8). Although containing elements of reflection, reflexivity is specific to the deeper considerations of research as the researcher explores the various processes of construction. Construction includes reality, the researcher's role and social contexts (e.g., language, society and paradigms) (Alvesson & Skoldberg, 2009; Shaw, 2010). The researchers role also encompasses the consideration of the researchers own background, experience and context. As well as how these elements (e.g., background, experience and context) influence interpretations of data, analysis, broader meaning and engagement with participants and interpreting data.

To be reflexive in a research context, researchers must be aware of subjective influence and the implications of subjective influence in relation to the research (Shaw, 2010). Drawing attention to the process of reflexivity allows the researcher to reflect on their work across the entire process of research, and critically analyse interpretations of reported events and data; whilst also identifying and exploring weaknesses. For example, various elements may cloud judgement about the nature of reality being reported (e.g., cultural, political, perceptual, cognitive, theoretical, linguistic) and therefore reflections should be made across various levels of the research process (ibid.).

Alvesson & Skoldberg (2009) present their reflexive interpretation of four levels in an attempt to indicate the “open play of reflection across various levels of interpretation” (p. 271). Within qualitative research reflection across interpretation is identified as crucial, as it is the researcher’s interpretations, judgements, intuition and ability to identify phenomenon under investigation which result in overall findings and conclusions. Alvesson & Skoldberg (2009) note, however, that reflexivity can be absent or minimal due to the structures and frameworks imposed by the researcher, limiting breadth and depth of interpretation. This is not to say that frameworks should be excluded, rather, a reflexive approach should be undertaken in the application of frameworks. This would include careful consideration of implications for the research and clear justifications of decisions. Thus, by exploring and applying Alvesson & Skoldberg’s (2009) four levels, a reflexive approach to research can be attempted. Note, the reflexive process across the four levels can be non-linear and iterative. The table below (Table 3.1) presents levels of interpretations as well as a definition for each level, summarising the work of Alvesson & Skoldberg (2009).

Table 3.1 Summarising four Levels of Reflexivity

Aspect/Level	*Focus*	*Nature of aspect/Considerations*
Interaction with empirical material	Accounts in interviews, observations of situations and other empirical materials	Researchers make observations, talk to participants, make preliminary interpretations - relatively low degree of interpretation
Interpretation	Underlying meanings within and of empirical data (e.g., interviews and observations)	Systematic interpretation, guided by choice of academic theories, paradigms or other frames of reference (e.g., cultural ideas, assumptions and implicit personal theories)
Critical Interpretation	Ideology, power, social reproduction	Researcher allows empirical data to reshape theory and theory allows for consideration of different meanings - in light of reciprocity between researcher and data
Reflection on text production and language use	Own text, claims to authority, selectivity of the voices represented in the text	Possibility of multiplicity of interpretations (e.g., breadth and variation of theory)

According to Alvesson & Skoldberg (2009) the application of the four levels across the research process encourages creativity, interpretation of constructions across levels and promotes the interaction of empirical data in relation to interpretation and theory. All levels should therefore be viewed as equally important and interlinked, in that the researcher must consider the questions and themes highlighted across all processes.

To conclude, the reflexive approach does not impose a framework. Rather, to be reflexive considers the nature of the researcher's subjectivity in relation to the wider meanings presented from data collection, analysis and theorisation. Including both what can be seen and what might be missing. In order to approach the current Doctoral research in a reflexive manner, the stance of the researcher is explored and presented (Section 3.2) and researcher background disclosed (below). Where necessary, the underpinning of the researcher's critical realist stance is highlighted in order to present the decision-making process and highlight reflexivity across the research.

Researcher Background

In acknowledgement of my subjectivity, the aim of this section is to outline my background, beliefs and experience which influenced the decision making across the current PhD study (Alvesson & Skoldberg, 2009). Prior to embarking on PhD study, I was a Secondary School teacher of Music for three years. I had also previously taught across Higher Education, Further Education and Primary Education, with educational experience spanning across 10 years. I believe that my background in teaching influenced my decision making throughout the current PhD research. For example, in my opting to research in Secondary Education – where I have experience of being a teaching professional and, therefore, wanted to contribute to research in this domain.

Whilst there were some decisions that were guided by my experiences, I was also mindful of excluding my subjective experiences and beliefs as a teaching professional (e.g., beliefs and interpretations about pedagogy). Attempts were therefore made to address my own subjectivity, when undertaking participant video recorded observations and interviews, by using guides (Sections 3.9, 3.10, 3.11) and through providing transparency of analysis (Appendix 12). For instance, within interviews, I asked participants to be explicit in their reflections and used stimulated recall to corroborate video recorded feedback with participant interpretations (Section 3.12). I decided to use participant corroboration rather than rely solely on my own interpretations, which may have been biased as a result of my own experiences. As noted in section 3.13, I also attempted to off-set bias and demonstrate rigour across the research, through transparency of methods, coding (Appendix 12), analysis (Chapter 4) and findings. For instance, I used a coded observation guide to identify examples of behaviours informed by the literature - rather than relying solely on my own interpretations. As noted in Section 3.2.1, it can be difficult to remove prior background, however, methods can be designed in order to account for and proactively reduce subjectivity. Through the broader considerations to my background and experiences when undertaking the current PhD research, I aimed to maintain reflexivity throughout the research process.

3.2.3 Positing of Current Literature

When exploring the current research on intelligence theories in education, much of the literature points towards a deductive approach. Data across studies measures theories of intelligence, through self-report questionnaires, in relation to outcomes. For example academic achievement, motivation, learning goals and response to failure (Blackwell, 2007; Claro et al., 2016; Haimovitz & Dweck, 2016; Rattan et al., 2012). Much of data is collected through the use of surveys and controlled experiments, as opposed to in-situ. Furthermore, presented data from the extant literature at the time of writing appears to be rooted in positivist approaches, through the presentation of fact based quantitative research (Alvesson & Skoldberg, 2009). Some research does, however include observations and interviews (Green, 2013; Rissanen et al., 2019; Song, 2018; Sun, 2015). It is evident that some researchers are taking an interpretive approach to enquiry in teacher intelligence beliefs, where data collection is guided by observations and underpinned through previous literature (ibid). Consequently, the data in the study aimed to follow a similar direction, the interpretive approach, framed specifically in this thesis by critical realism.

3.3 Ethics in Research

Section 3.3 covers the ethical considerations and guidelines followed across this Doctoral thesis, in order to ensure both the participants were kept from harm and to establish rigor in research. Ethical guidelines provide a set of considerations that researchers must acknowledge and explore when planning research (Cohen, Manion, & Morrison, 2011). In line with ethics in research, the institute of the researcher (Liverpool John Moores University - LJMU) ensures appropriate research teams consider, outline and plan ethics before research takes place through ethics applications. Good ethics (e.g., participants' best interests and safety) at LJMU are achieved through the use of an ethical scrutiny process, whereby the researcher is required to submit the procedure, including methods, rationale, justifications, outline of research and accompanying documentation (e.g., participant consent forms, questionnaires, interview questions etc.). The ethical application which accompanies this Doctoral study is presented in Appendix 1.

At the time of writing, the British Educational Research Association, which aims to develop policy for research in education in Britain, provide many areas for consideration when researching in education (BERA, 2018). Prior to the current Doctoral research taking place, the researcher consulted the BERA (ibid) guidelines to identify specific areas relevant to this Doctoral study and included the identified guidelines in the University ethics application process. BERA (2018) guidelines identify key responsibilities researchers have to participants, such as: ensuring the attainment of consent, transparency across the research and making clear participant's right to withdraw at any given point. Ethics also extend to policy for publication and dissemination, where researchers have a responsibility to present work in an appropriate format.

Following the BERA (2018) guidelines participants (teachers) of this Doctoral study were provided with key objectives, their role in the research and data collection and management procedures. Details of the study were outlined on the participant information document (Appendix 3). The participant information document aimed to inform participants about how their data was securely stored, managed and used, as well as their right to withdraw at any point (Cohen et al., 2011; Day, 2012). Participants were also encouraged to ask questions, if information was not clear or they did not understand a procedure. Any paper based personal data (e.g., written consent) were stored in a locked filing cabinet on university premises, with researcher access only, in order to ensure confidentiality and privacy (British Educational Research Association, 2011). All participants were required to complete and return the participant consent form in accordance with ethical considerations outlined in Appendix 1 (ibid).

In order to ensure anonymity across methods, participants were required to provide the 1st two letters of their 1st name, 1st two letters of their birth month and final two number of their phone number in order to create a unique ID code. This was for the purposes of anonymity and matching observations and interviews. In later analysis teachers were identified by numbers and matched to data (e.g., teacher 1). Teacher participants were presented in the data numerically (e.g., 1 – 10) and pseudonyms used instead of real names.

The methodology (see Section 3.7) included video recordings of teachers and pupils (e.g., if students were interacting with teachers). However, given that teachers and head teachers are recognised gatekeepers of students, who were under 18, it was possible to attain gatekeeper only consent for recordings. In accordance with ethical clearance from LJMU, gatekeeper consent avoided the requirement to attain consent for parents. The camera was positioned in a way which was focused on teachers, and it was gatekeeper's responsibility to ensure all students in the class held media consent forms. Media consent documentation is completed by guardians at the beginning of students' secondary schooling. Gatekeeper consent was agreed by the university through media consent in the ethics application, and it was the responsibility of gatekeepers to ensure media data were not collection on students where media permissions were not sought. Any media data collected, however, was to be stored on the university secure server, with research access only (password protected). Across the research process the ethical protocol was followed. Full details of the ethical application, as approved by Liverpool John Moores ethics committee, for this Doctoral research can be found in Appendix 1 (approval code 17/EDN/005).

3.4 Mixed-methods Approach

Data for this research were collected through quantitative and qualitative procedures, therefore a mixed-methods approach using questionnaires (Payne & Payne, 2004; Tymms, 2012), observations (Angrosino, 2012; Buehl & Fives, 2009) and semi-structured interviews (Biesta, 2012; Cohen et al., 2011; Teddlie & Tashakkori, 2010). Given the extensive amount of quantitative and experimental which exists in the study of theories of intelligence (Section 2.9). The decision to use mixed-methods was to explore the research using qualitative methods of data collection, where there is limited research, as well as to provide depth (Sections 3.8 and 3.9) and answer research questions (Section 1.2) (Claro et al., 2016; Dweck et al., 2017; Rattan et al., 2012). Furthermore, quantitative research methods only would not allow for emergent theme exploration in interviews, while qualitative only methods would not allow for comparisons between self-reported belief and teacher intelligence feedback comparisons.

Furthermore, mixed-methods have been frequently applied in teacher beliefs research, which aims to explore the role of beliefs in the educational context, in an attempt to capture the complexities of behaviour (e.g., reported beliefs and subsequent teaching events) (Biesta, 2012; Hoffman & Seidel, 2014; Levin, 2014). In relation to this Doctoral study, the concern here is the intelligence feedback of teachers in conjunction with their theories of intelligence. Studying teacher understanding and justification of their actions and how intelligence feedback in their teaching may or may not be suggestive of reported theory. Therefore, a combinatory approach of qualitative and quantitative approaches was deemed appropriate. Similar methodology is also used in more recent work, which has investigated teacher intelligence belief, although limited to the Finnish context (Rissanen et al., 2018a; Rissanen et al., 2019).

According to Greene et al., (1989), researchers employing a mixed-methods design can consult framework to guide the researcher to select the most appropriate methods for answering the research questions at hand. Through the analysis of 57 empirical mixed-method studies, Green et al., (ibid) proposed a conceptual framework for the application of mixed-methods in research. The framework includes five types of mixed-methods approaches, exploring the purpose of the mixed-methods design, and seven characteristics of mixed-methods. The five purposes for using mixed-methods, which were generated from the Green et al., (ibid) theoretical review, each seek an alternate outcome in terms of research design. These are as follows:

- **Triangulation** – Uses differing approaches to offset biases when measuring the same phenomena, with methods used to converge with one another.
- **Complementary** – Differs from triangulation in that it requires the use of different methods in order to measure overlapping, but also different, conceptual phenomena. This is characterised as a multi-layered approach.
- **Development** – Methods are used sequentially, with one method used to inform and develop the next.
- **Initiation** – Emergence of perspectives through the use of alternative methods, such as the used of quantity methods in order to address discrepancies in qualitative research and vice versa.
- **Expansion** – The use of qualitative methods to measure processes and quantitative methods to measure outcomes.

The purpose of the research methods of this Doctoral study, underpinned by the work of Greene et al. (1989), is identified as the ‘complementary approach’. The complementary approach aims to measure overlapping, but different, facets of a phenomenon As a result, the data yielded is enriched and can be elaborated, through the use of various methods. Green et al. (1989) identify the complementary approach as “peeling layers of an onion” (p. 258), where different methods can be used to elaborate on data collected by other means (e.g., questionnaires to identify self-reported theory of intelligence and interviews to elaborate on intelligence beliefs). The complementary approach was particularly relevant in this work, where theories of intelligence were measured (e.g., questionnaire) and compared in relation to the analysis of enacted behaviours (e.g., intelligence feedback - measured through observations) and reported beliefs about these behaviours (e.g., measured through semi-structure interviews). The complementary approach may appear similar to triangulation, in that methods and analysis of data are compared to provide corroboration of phenomena. Although, the complementary method seeks elaboration, enhancement, illustration and clarification of the results from one method, with the results from the other method (Green et al., 1989). As well as increasing interpretations and validity through the chosen methods. Overall, the use of complementary mixed-methods aimed to provide means to further explore teacher intelligence beliefs, through the implementation of tools outlined within this chapter (for methods overview Section 3.7).

To reiterate, for the purposes of contextualising the study methodologically, the research questions for this study were as follows:

> *Research Question 1. (RQ1)* Do teachers' theories of intelligence correspond with their intelligence feedback; if so in what ways?
>
> *Research Question 2. (RQ2)* What types of intelligence feedback do teachers' believe they socialise to students?
>
> *Research Question 3. (RQ3)* What are teachers' beliefs about internal and external factors in relation to their intelligence feedback?

The chosen data methods, as discussed below, were used in the following was in order to answer the research questions.

3.5 Pilot Study

A pilot of the final methods was undertaken, aiming to test the data collection methods for this phase; notably, within the research context (e.g., school setting). The pilot also provided the opportunity to make any refinements, if deemed necessary (Day, 2012). The researcher pre-tested all methods beforehand in order to address any technicalities with may have arisen, for example problems with the online questionairre or camera set up for observations. A full report of the pilot study can be found in Appendix 8, whilst also published by Cutler, Mallaburn, Putwain & Daly (2019). Given that no changes were required, data from the pilot were included in the main study (participants 1 – 3). The inquiry approaches were chosen in relation to the research questions, employing questionnaires, observations and semi-structured interviews. Details of the methods and rationale are provided in the following Sections (3.7), as well as recruitment and sample size (Section 3.6).

3.6 Recruitment and Sample

Recruitment of schools was achieved through convenience sampling, which targets participants most accessible to the research, commonly used in research due to time constraints of a research project (Coe, 2012; Cohen et al., 2011; Teddlie & Yu, 2007). School recruitment was achieved in the current Doctoral study through the use of local networks. For example, contacting teachers connected to Liverpool John Moores University, school head teachers, or the personal assistant of head teachers and professional teacher networks. Type of school (state, academy, specialist, faith etc.), location or gender specific schools (single-sex or mixed) did not apply, rather any school or teacher opting to take part was chosen. In the first instance, schools with direct links to the university (LJMU) were approached (convenience sampling), with additional schools targeted via snowball sampling. For example, participants recommend other schools which may be interested in taking part, to increase data collection (Cohen, Manion, & Morrison, 2011). The appendix 9 provides an overview of each school profiles who took part in the study, however the figure below demonstrates the recruitment process (Figure 3.4), including schools contacted, opted out and took part:

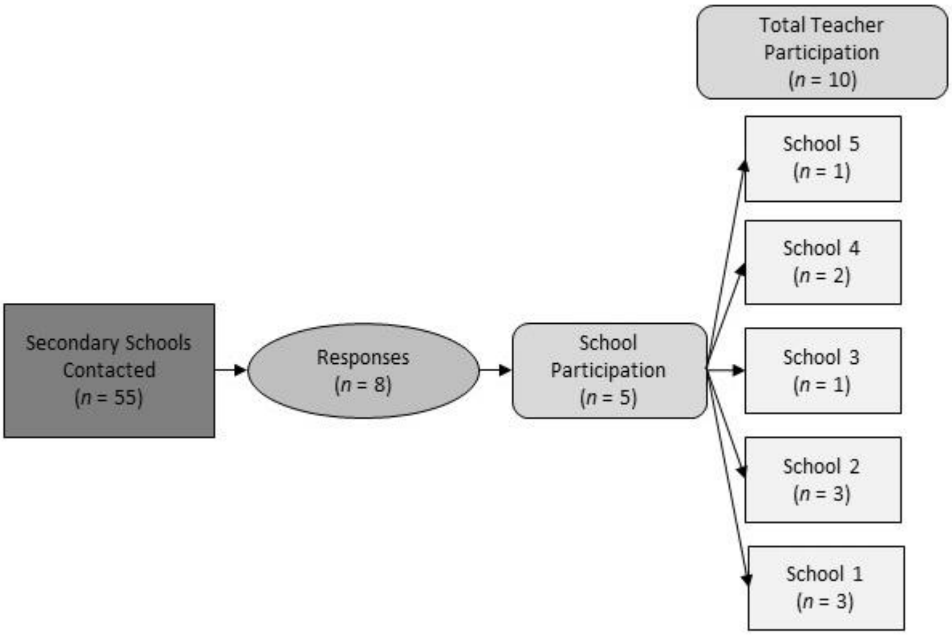

Figure 3.4 Recruitment Process for Research in Schools

It was either head teachers directly or a teacher point of contact, who were required to respond if they were interested in taking part and to attain more information (via email, telephone or meeting). Those teachers agreeing to take part in the research were required to provide a contact email for the head teacher or PA in order to attain gatekeeper consent (see Appendix 2). Following gatekeeper consent, an email was circulated among teaching staff, via in school networks, in order to inform other teachers of the research project. The email contained participant information (Appendix 3) where an outline of the project, participant's role and informed consent was provided. Inclusion criteria for the entire study was recognised as teaching professionals in secondary education of any gender, teaching any subject, for any length of time, to any year group. Consequently all teachers opting to take part could be included. The requirement was participants must be currently teaching, however years in teaching was not a limiting factor. Participants were not excluded, rather all teachers whom volunteered to take part were included. Those opting to take part were required to complete participants' forms and return via email or paper, directly to the researcher. In accordance with research ethics (see Section 3.3.) all forms were stored in a locked filing cabinet in the researcher's office on IM Marsh campus (researcher access only).

It is important to note that sampling teachers through convenience can present bias, for example selecting participants of the same gender and ethnicity (Fives & Gill, 2014b). The researcher attempted to address any bias in this research by contacting head teachers and asking to send a call for participants directly, rather than the researcher or head teacher self-selecting teachers. All teachers who expressed an interested were included in data collection and analysis, in an attempt to address any bias. A selection of schools were also targeted, ranging from faith schools, academy schools, local authority schools and special schools (see Section 2.8 for educational context in England). The sample area was originally the North West, which then extended to the North East, following poor response rates.

A sample of 10 participants were available to take part in the study. 3 additional teachers expressed an interested, however it was not possible for these teachers to take part, due to unforeseen factors (e.g., maternity leave, OfSted in school and illness). It was identified that a smaller sample would provide the opportunity to deeply explore the rich data (e.g., detailed descriptions from semi-structured interviews teachers and in-depth analysis of observational data, collected through the chosen qualitative methods (Olafson et al., 2014). The in-depth analysis and exploration of data was a key consideration within this Doctoral research, as little work investigates teacher beliefs of intelligence, their intelligence feedback and attributions for intelligence feedback, in relation to their stated beliefs. When surveying the literature of teachers' beliefs, it was noted that the methodology and subsequent analysis within this research would yield a large amount of data (ibid). Therefore it was critical to ensure collection, analysis and interpretation was undertaken rigorously (see Section 3.13 for interpretive rigor). Consequently both the collection and analysis of data was also time consuming, and thus time was an additional factor for a smaller sample size.

3.7 Overview of Methods

The three methods chosen for this study were questionnaires (to measure teacher intelligence belief), video observations (to code intelligence feedback in relation to intelligence beliefs) and semi-structured interviews (to discuss teacher attributions for their behavior, through stimulated recall). Intelligence feedback recorded in observations were underpinned by previous literature, associated with theories of intelligence (see Sections 3.10 & 3.11). The questionnaire was used as a measure to compare individual's observational intelligence feedback to their stated belief, as well as comments within interviews. For example, measuring if teacher's self-reported belief and subsequent intelligence feedback matched.

Figure 3.5 summarises the methods and analysis, while the Sections 3.8, 3.9, 3.12 provide details of each method and subsequent analysis (3.14). The order of methods was chosen based on each method reliant on the previous – notably the interview, which was underpinned by coded data from the observation. The questionnaire was used for comparison across data, and therefore chosen to be the first method in the procedure. Phase one (Section 3.14.1) thematic analysis was chosen in order to answer the RQ's (Section 1.2 and Chapter 5), while phase two was undertaken using abbreviated grounded theory (Section 3.14.2), for the purpose of theoretical development (see Chapter 6). Details of analytical process (e.g., Inductive, deductive and retroductive) can be found in Section 3.14.3.

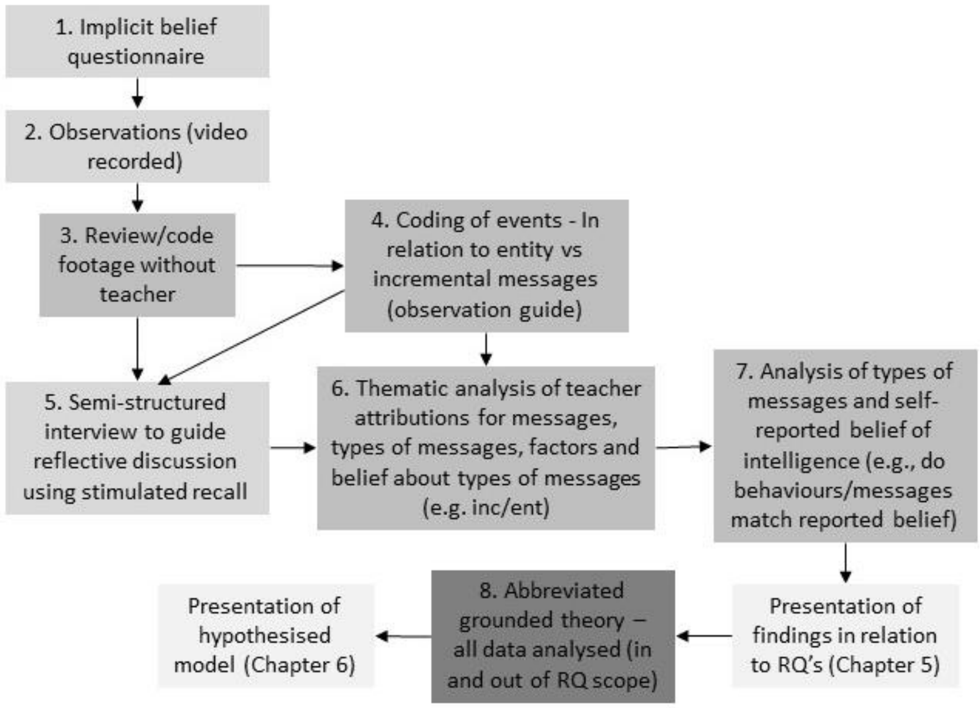

Figure 3.5 Overview of Methodological Process

3.8 Questionnaire Data

Questionnaires were circulated to participants by email, with the option to complete via Bristol Online Survey or to print and return (Appendix 4). The purpose of choice was to increase the likelihood of response rates, which took approximately 3 minutes (Payne & Payne, 2004; Tymms, 2012; Vehovar & Manfreda, 2008). Questionnaire data were collected once across the study, in order to measure teachers' self-reported theories of intelligence. The questionnaire was the four entity only items from Dweck, Chiu & Hong (1995) original implicit theory measurment questionnaire (estimated Cronbach's alphas ranged from .94 to .98 across multiple studies). These four questions were:

1. You have a certain amount of intelligence, and you can't really do much to change it.
2. Your intelligence is something about you that you can't change very much.
3. To be honest, you can't really change how intelligent you are.
4. You can learn new things, but you can't really change your basic intelligence.

Answers were given on a six-point Likert scale of 1 = 'strongly disagree', 2 = 'disagree', 3 = 'slightly disagree', 4 = 'slightly agree', 5 = 'agree', 6 = 'strongly agree'. Two versions of this questionnaire have been used in previous studies. One contains 8 items (4 entity and 4 incremental items) and the other contains 4 entity items only. In the present study I used the version containing only the 4 entity items (more recent research reported α = .87) (De

Castella, 2015). The decision to use the entity items only was made in order to avoid the positive wording effect noted in recent literature (Yu & Kreijkes, 2017). The administration of entity only items has also been used across other recent studies, due to acquiescence bias, where individuals' are attached to positively worded items (Paunesku et al., 2015; Yeager et al., 2016). Research suggests individuals are more likely to report incremental theories, particularly among teachers who have engaged with 'mindset' professional development in the past, as a result of social desirability (Song, 2018). Results in this study were scored by combining the four scores of each question and calculating the mean. Lower scores represented a pure endorsement of incremental belief (1) and (6) the higher end represented a pure endorsement of entity beliefs. The exact ranges, determined by Claro et al. (2016), are as follows (Table 3.2):

Table 3.2 Intelligence Belief Scoring System

Intelligence Theory	***Score***
Incremental	1 – 2
Mixed theory	2.1 – 4.9
Entity	5 – 6

Although the theory of intelligence questionnaire has been successfully implemented in other studies, it is important to note that self-measures, of all types, can be nuanced. As previously noted, social desirability can be an issue with self-reports as well as individuals not accurately reporting their beliefs. Furthermore, Pajares (1992) notes that teachers beliefs can be more accurately inferred from what they say and do, therefore suggestions are made to validate findings through a combinatory approach to data collection (Section 3.4 for details of mixed-methods combinatory approach). Consequently, the use of the intelligence belief self-measure provided the opportunity to compare data, for instance, with observational intelligence feedback (see Section 3.8) and interview comments (see Section 3.12).

In addition to the intelligence belief measure, the questionnaire contained basic demographics (e.g. age, gender, ethnicity, subject and length of teaching) (Salkind, 2010) and a series of multiple choice questions regarding previous interactions with intelligence belief training (e.g., growth mindset INSET). Including previous interactions with intelligence belief research was considered key, as one of the only studies undertaken in England, by the EEF, noted that data of this kind were not collected in their research and may have affected the success of their teacher INSET intervention (Rienzo et al., 2015). The questionnaire required participants to provide the first two letters of their first name, the first two letters of their birth month and the last two numbers of their phone number (e.g., CHJU88). Using this coded method, data from questionnaires could be matched anonymously with observation and interview data, whilst maintaining the anonymity of participants (British Educational Research Association, 2011).

3.9 Video Recorded Observational Data

Following questionnaires, recorded observations of one lesson per teacher (approx. 60mins) were undertaken in order to examine teacher intelligence feedback and use excerpts for discussion in semi-structured interviews (see Section 3.12). The data would be unattainable through other methods, notably as observations were in-situ to capture teachers' in everyday and in-situ scenarios (Angrosino, 2012; Buehl & Fives, 2009). Observations have been suggested in other studies of theories of intelligence in order to uncover naturalistic behaviours (e.g., intelligence feedback) (Dweck et al., 2017; Lin-Siegler et al., 2016). While observations are also acknowledged as an integral way to uncover teacher beliefs, when combined with other methods (e.g., questionnaires) (Pajares, 1992). There are limited investigations which have studied teachers intelligence feedback in situ, however pre-existing studies have been culturally specific (e.g., Finnish and USA culture) (Rissanen et al., 2018a; Sun, 2015). Furthermore, a framework for 'growth mindset' teaching has been proposed for the US context, however this was subject specific for maths (Sun, 2015), therefore the guide here sought to compile general teacher intelligence feedback across various studies spanning from 1983 - 2019.

In teacher belief research, observations are also identified as a useful way to document teacher feedback and compare to teacher stated beliefs. A selection of studies which apply this methodology are outlined by Schraw and Olafson (2014) (e.g., beliefs about knowledge, classroom practice and self-efficacy in relation to classroom practice). As the research in this study aimed to further understand teacher intelligence beliefs and intelligence feedback, the use of questionnaire and observations was deemed as a useful method, given the successful application across other belief studies (see Schraw & Olafson, 2014) and limited evidence in theories of intelligence research at present.

Stimulated Recall

The observations were achieved through video recording, where the researcher set up equipment beforehand and left the classroom in order to be unobtrusive and non-interventional, thus taking on the role of a "complete observer" (Cohen et al., 2011, p. 457). The use of video footage aimed to provide the opportunity for coding of intelligence feedback and stimulated recall in the semi-structured interview, where teachers could reflect on their behavior and decision making whilst viewing events (Francis, Rapacki, & Eker, 2014). Stimulated recall is described as a way to prompt individual's deeper thinking, conceptualisations of past events, support teacher thinking, assist with verbalisation of beliefs and revisit pedagogy through video reflections (Francis et al., 2014; Moyles, Adams, & Musgrove, 2002). The approach is common in qualitative belief research and has been used in several Finnish studies, which aimed to further understand teacher's intelligence beliefs in practice (Rissanen et al., 2018a; Rissanen et al., 2019). Research has also been undertaken using stimulated recall in order to explore how stimulated recall can influence teacher thinking and change pedagogy, however belief change was outside the scope of this research (Tripp & Rich, 2012).

Categorisation guide

Underpinning the observations was an observations categorisation guide, theoretically derived from literature (see Sections 3.10 and 3.11). The purpose of the guide was to address subjectivity of intelligence feedback, when analysing data. The guide was also useful in providing example of intelligence feedback which were described as associated with intelligence beliefs. For example, praising for ability (see Section 3.10.3). Given that the researcher's background is in education, as a former teacher, and recognising the influence of subjectivity in accordance with critical realism (Section 3.2.1), the use of an observation guide also aimed to provide objectivity of analysis. The literature for the observation guide contains additional considerations that the researcher was aware of, for example, gender specific intelligence feedback (Section 3.10.4), use of autonomy (Section 3.11.2), and tasks (Section 3.11.1). However, these were noted in the comments, rather than directly in the observation guide, in order to discuss further if present.

Details of the guide and process are included in each section of the literature below, which indicates an association with a code (e.g., 3.10.2 Motivation - Observational Codes: ML, Sf, Cf, F/E). The guide includes intelligence feedback (e.g., behaviours) which were associated with entity and incremental feedback, as underpinned by literature. An additional code of 'neutral' was also included, where teachers provided feedback which was positively or negative valance, however not explicitly attached to an entity or incremental feedback. For instance, 'well done' following a task insinuates positive valance and intelligence, however not explicit (Ruiz-Primo & Brookhart, 2018). Neutral feedback is outlined on the observation guide and more details provided in Appendix 8, which covers the pilot study of this Doctoral research.

This observational template and observation framework (see Appendix 5, Table 5 and Appendix 6) aimed to provide structure and assist with validity of measurement across observations (Angrosino, 2012). Consequently, establishing validity pre- and post- use through literature, theoretical underpinning and empirical data targeted both theoretical and methodological triangulation within the template (Biesta, 2012; Hoque, Covaleski, & Gooneratne, 2013). Theoretical triangulation draws upon various theories to inform the study, whereas methodological triangulation provides validity through combing data from a selection of methods (ibid.). Following the video recorded lesson, the researcher reviewed the footage and coded events using the observation template, before discussing observational intelligence feedback in a semi-structured interview (see Section 3.12) with teachers, in order to discuss their interpretive explanation of events. Once collected, all video data was transferred to the LJMU password protected server, onto the researcher's account, and assigned the corresponding unique teacher code in order to provide data security and participant confidentiality (Corti, 2008). Table 3.3, below, presents the observation categorisation guide.

Table 3.3 Observation Categorisation Guide

Code/Event	*Actualised through*	*Incremental Feedback*	*Neutral*	*Entity Feedback*	*Literature*	*Key considerations*
F/E = Failure/Error - Teacher response to students' failure and errors (feedback)	Intelligence feedback	Teacher encourages student despite failures, errors or struggling with concepts (e.g. student gets question wrong, teacher uses as a learning opportunity to explore and develop answer/why the answer is incorrect or correct)	No neutral behaviour	Reprimands student for errors or ignores them and moves on (e.g. "no that's not the answer" and moves on to ask another student) – no opportunity for development of answers and/or clarification.	Blackwell 2007; Dweck 1999; Gutshall 2013; Rissanen et. al, 2019	Behaviour which follows may need to be noted, not just direct message in order to fully explore teachers' response and subsequent tacit messages
Fb- = Type of criticism feedback teacher gives to student, this can be pre, mid or post tasks	Intelligence feedback	Process-feedback (criticism) - Students are criticised for their lack of effort or process/strategies within a task in order to achieve result (e.g. "You can work harder on this", "you haven't tried to think about it in a different way")	Students are criticised; however, this is unaccompanied by positive or negative language (e.g., This isn't your best work).	Person-feedback (criticism) - Criticism based on students' natural ability, fixed traits, goodness or performance of a task (e.g. "This isn't good - You're slow " "you're lazy")	Muller & Dweck 1998; Kamins & Dweck 1999; Ying-Yi 1999; Snyder 2014; Gutshall 2013; Park, Gunderson, Tsukayama, Levine & Beilock 2016	Specific type will need to be further analysed - e.g. what type of feedback is given (effort, strategy praise). Strategies here are exhibited by student as opposed to strategies given in strategy praise.
Fb+ = Type of praise feedback teacher gives to student, this can be pre, mid or post tasks	Intelligence feedback	Process-feedback (praise) - Students are praised for their effort and the processes/strategies within a task in order to achieve result (e.g. "well done – you've worked hard")	Students are praised; however this is unaccompanied by incremental or entity association (e.g., "good" "well done").	Person-feedback (praise) - Praise based on students' ability, traits, goodness or performance of a task (e.g. "you're clever", "well done on completing that so fast")	Muller & Dweck 1998; Kamins & Dweck 1999; Ying-Yi 1999; Snyder 2014; Gutshall 2013; Park, Gunderson, Tsukayama, Levine & Beilock 2016; Sun, 2015	Specific type will need to be further analysed - e.g. what type of process is given (effort, strategy praise). Strategies here are exhibited by student as opposed to strategies given in strategy praise.
Fb = General FB unaccompanied by intelligence feedback (praise, criticism). Can be valanced.	Valanced - Suggestive intelligence feedback	N/A	Feedback of this type is neutral by nature in that students are not praised or criticised – rather they are given feedback is disassociated with entity/incremental. Teacher may read through work or make an acknowledgement of students' efforts,	N/A	Haimovitz & Dweck, 2017; Pinter, 2015; Ruiz-Primo, 2018	

			however provide no FB/praise/critique.			
C = Use of language and tasks in relation to level of **challenge** (feedback/practice/ac tivities). Challenge is for development.	Suggestive intelligence feedback	Pupil is challenged to think about work, given scaffolding to consider or prompts to challenge. (e.g., “what do you think you need to do here? How could you improve this?”) Work is completed and additional challenging work is provided - work set is appropriate differentiated (e.g. differentiated tasks dependent on understanding thus far)	No neutral behaviour	Pupil is given answer directly, with no option to consider in order to complete answer – prescriptive (e.g., “you need to do this” “This is the answer”) Work is completed - student is not provided with a challenge or work set is not appropriately differentiated (e.g. same task for all)	Dweck 1999; Snyder 2014; Gutshall 2016	Other factors to consider - do students actually understand work, what part of the lesson is this (e.g. beginning in order to get students' thinking). Logistically may not be possible if timing doesn’t allow. Requires discussion in interview.
Sf = Strategy-feedback – teachers encouragement of strategies or additional strategies provided to pupil (feedback **Cf = Comfort-feedback** – teachers comfort student for lack of understanding (feedback)	Intelligence feedback	Strategy-feedback - Promotion of persistence at completing work through providing new (or reminders of) learning strategies E.g. “I know you're struggling but you need to look at this a different way by....”	No neutral behaviour	Comfort-feedback - Student comforted, with little assistance given to overcome problem (e.g. “It's okay, not everybody gets this”)	Dweck 1999; Rattan, Good & Dweck 2012; Gutshall 2016	Clear separation of teacher strategies provided to students’ and students’ use of strategies praised/criticised in intelligence feedback. Comfort feedback and strategy feedback may coincide - for example “it’s okay not everybody gets this first time, you need to think about it in a different way…” Can be implied within work set – e.g. “I’m giving you this information to help in the future so you have strategies you can use”
ML = General comments to students in relation to **motivational language**, on task vs. off-task/following instructions – whilst	Environment - Suggestive intelligence feedback	Teacher attempts to motivate students when struggling or become off-task - language is positive (e.g. “This might be difficult, so you need to concentrate and pay attention”)	Teacher attempts to motivate students with general prompts which are non-specific (e.g., are you working on this, what are you doing? “Shhh”)	Teacher doesn't make an effort to motivate students when struggling or off-task - language is framed negative (e.g. “Hurry up”)	Lin-Siegler 2016; Gutshall 2016; Haimovitz & Dweck, 2017	Must be critical with motivational language and differentiate between this and feedback - feedback is in response to a specific student outcome, whereas motivation language is ongoing/general. Clarification

engaged in task (feedback). Teachers communicate high or low expectations in relation to student behaviour, work completed and students' approaches to learning – in response to teacher's instructions and belief of how successful students are at following instructions (SRT)						might be necessary with teachers during interviews. Expectation is encompassed within motivational language in that teachers' expect an outcome and motivation students in accordance to their expectations
G =The **goal structure** of classroom is made clear through work set to students (Feedback/practice/activities)	Environment - Suggestive intelligence feedback	Learning tasks (or work) are emphasised - the development of skills, learning and progressing e.g. indication of where a student is at this moment in time in order to develop/this will help you understand the next topic and develop your knowledge	No neutral behaviour	Performance tasks (or work) are emphasised - achieving the highest grade possible and attainment relative to others (e.g. result is an indication of students ability and indicates a measurement of worth in comparison to others or you to get a good grade and be the best in the class)	Gutshall 2016; Lin-Siegler 2016; Park, Gunderson, Tsukayama, Levine, Beilock 2016; Muller & Dweck 1998; Rattan, Good & Dweck 2012; Shim, 2013	Differentiation between goal of long term work and short term work - is the work in class, at that moment, for a short term measure of attainment in order to assist with long term learning.

3.10 Observation Categorisation Guide: Categorisation of teacher instruction (Part 1)

The intelligence feedback of teachers were measured and coded in relation to the incremental/entity intelligence feedback highlighted across previous research (e.g., response to failure/errors, facilitation of tasks, process versus product feedback, emphasis on effort etc. – full reference list in Appendix 6) (Kamins & Dweck, 1999; Mueller & Dweck, 1998; Rattan et al., 2012; Skipper & Douglas, 2015). Within the research of Rissanen et al. (2018a) a framework for growth mindset pedagogy is provided, as a means to identify incremental behaviours associated with pedagogy (e.g., person based practise and encouraging persistence). The framework by Rissanen et al. (ibid) provided a useful starting point for observational data, however, in order to gain a more detailed analysis, this Doctoral research collated previous literature into a categorisation guide (see Table 5 and Appendix 6).

The guide (Table 3.3 and Appendix 6) in this research was compiled through survey-analysis of teacher intelligence feedback in literature, as associated with incremental and entity beliefs. A broad literature search was undertaken using Liverpool John Moores journal search engine 'Discover', which included databases such as ERIC and PsychInfo. Search terms were "implicit theories of intelligence* teachers", "implicit theories of intelligence* behaviour*" and "growth mindset* teachers". Various studies appeared which contained both student and teacher behaviour, therefore where there was no mention of teacher behaviour, or focus was on students, studies were excluded. Overall, at the time of the search, 13 studies were identified as suitable for the observation categorisation guide, as these provided examples of behaviours associated with intelligence beliefs (see Sections 3.12 & 3.11).

A limitation of the literature, however, was identified in the lack of studies undertaken at secondary level (students and/or teachers). This was problematic as the current Doctoral research was undertaken in secondary schools, where context differs from primary school (e.g., student age, larger schools/class sizes, different policies, subject teacher etc.). As well as this, studies were undertaken using quantitative and experimental methods, rather than qualitative and in-situ. Therefore, the existing research uncovered in the search was useful in identifying potential intelligence feedback of teacher's in-situ and an appropriate way to underpin the categorisation guide (Section 3.10). Note, literature pertaining to the observation guide was identified as a key aspect of the methodology, and therefore the underpinning literature is included in the methodology, rather than the literature review.

As the categorisation process was tested in the pilot study (Section 3.5 and Appendix 8), the first observation yielded data which highlighted that were uses of additional intelligence feedback not yet tested literature, but linked to theory of intelligence (e.g., motivational beliefs). New codes were subsequently yielded and incorporated into the categorisation guide and further linked to the extant literature (e.g., all neutral coding motivational feedback, non-related to theory of intelligence) (Haimovitz & Dweck, 2017; Pinter, 2015; Ruiz-Primo & Brookhart, 2018). Literature pertaining to the observational categorisation is discussed in detail below.

3.10.1 Process versus Person: Praise and Criticism (Observational Codes: Fb+/Fb-)

According to research there are two prominent types of feedback given to children in relation to learning, implying the source of one's intelligence (Dweck, 1999; Meyer, 1992; Mueller & Dweck, 1998). Praise within teacher practice has been categorised as either *process*, where emphasis is on the process involved in the outcome (e.g., because you have worked hard you have achieved), or *person* which focuses on the individual and their traits (e.g. you are clever therefore you achieve) (Kamins & Dweck, 1999). Kamins and Dweck (1999) applied this dichotomous categorisation to both praise and criticism, where the process, or lack of, is criticised (e.g., "that wasn't your best effort"). In contrast to person criticism which points toward the individual (e.g., "you are lazy"). When person criticism is used by teachers it can cause a lack of self-worth in students, as a result of suggesting students' possess an innate trait (op. cit.). Within their research, Kamins and Dweck (1999) noted those receiving process feedback (praise or criticism) are more likely to attribute their successes and failures to traits which can be developed (e.g., intelligence, goodness or worthiness). As a result, process intelligence feedback socialises an incremental theory from adults to children. Person feedback, however, implies an individual has an unchangeable innate trait or ability, and thus socialises entity theory (Cimpian et al., 2007; Gunderson et al., 2013; Kamins & Dweck, 1999; Meyer, 1992; Mueller & Dweck, 1998; Skipper & Douglas, 2012).

Praise to Raise Self-Efficacy: Conventional Wisdom

Kamins & Dweck (1999) indicate that person praise has been commonly associated with positivity in that educators believe this raises students' self-efficacy, citing "conventional wisdom" (p. 1). Authors cite conventional wisdom as an individual's belief that praising for intelligence will boost confidence and motivate students across tasks. Indeed, raised self-efficacy was noted in the short-term, however, there are consequences to person praise. Notably, the socialisation of an entity belief.

Through two studies which examined the use of intelligence feedback across scenarios with kindergarten students (ages 5 – 7, *n* = 131) Kamins and Dweck (ibid) discovered that learners receiving person praise were more prone to exhibit a helpless response in future challenge. Helpless response were measured through children's product ratings, self-assessments, reported mood, persistence, and general beliefs about badness. A helpless response included not attempting to complete challenging tasks, lack of motivation across setbacks, self-blame, lowered expectations and attributing failure to lack of ability. Despite the short-term gains of raised self-efficacy in those receiving person praise, students' long-term progress was impeded as they were less likely to attempt challenges. Given that person praise socialises innate intelligence, researchers suggested that reduced motivation was as a result of student's fear of failure, an outcome linked to an entity belief. Notably, either process critiquing or process praising yielded positive results in motivating, through socialising an incremental theory to students', when challenge was presented.

Similar findings were discovered when researchers examined subtle language differences in teacher feedback (Cimpian et al., 2007). The study investigated generic praise, which is a present-tense stable trait and associated with person praise (e.g., "John is friendly"), and non-generic praise, a past-tense malleable trait and associated with process praise (e.g., "John was friendly at the party"). 24, four year olds in USA were involved in the study, where researchers acted out scenarios using two puppets. One puppet represented a teacher asking the children to draw specific objects and the other represented the child, whom responded to requests. Following successful completing of tasks (no actual drawing was involved, rather students drew objects in the air) the teacher puppet praised the children with either generic praise (e.g., "you are a good drawer") or non-generic praise (e.g., "you did a good job drawing"). Following praise administration two other drawing tasks were requested, where children's mistakes were highlighted to allow researchers to measure children's reactions. Self-evaluation questions were also given following mistakes, with both success and persistence related questions. The results indicated that there were no differences in generic or non-generic praise until the children experienced failure. At this point children receiving generic praise responded with more helpless behaviour in comparison to those receiving non-generic praise, on post-mistake measures (t(22) 5 2.86, prep 5 .953, d 5 1.17). The emotional responses of those receiving generic praise were also identified as more extreme, and poorer strategies were employed by children for correcting mistakes.

When comparing studies examining the use of feedback, the difference between praise types is subtle. Noting subtleties, Cimpian et al. (2007), identified that adults are unaware of the implications of feedback, and more likely to use intelligence feedback interchangeably. Despite the previously identified ramifications of some intelligence feedback (e.g., negative effects of person-praise), the study of teacher feedback types in relation to their intelligence beliefs in-situ is limited. Other studies have explored teacher feedback statements, including general (e.g., nice one, well done), specific (e.g., well done for following instructions), corrections (e.g., no, that is wrong) and neutral statements (e.g., instructional – turn to page 22) (Pinter et al., 2015). However, these statements were researched to assess the effectiveness of a video intervention, which aimed to investigate the impact of reflection through video, and not linked to teacher beliefs.

Codes

Overall, the intelligence feedback which was associated with criticism was coded as Fb-. Criticism feedback was identified as incremental where teacher's critiqued student work, however identified why work was not of a good standard. For example, identifying poor quality work because of a lack of effort. While entity criticism feedback attributed poor work to the individual, for example work is poor because a student does not have the ability. While positive intelligence feedback was coded as Fb+. This code referenced student success, attributing success to the person (e.g., entity intelligence feedback) or the process (e.g., incremental feedback) (see Table 3.3 for further examples).

3.10.2 Motivation (Observational Codes: ML, Sf, Cf)

Another area identified for consideration in intelligence feedback is teacher motivational language. Motivational language is defined in terms of feedback to students which attempts to motivate, encourage students to maintain effort and promote achievement in learning. Motivational language may or may not reflect typically associated comments related to intelligence beliefs (e.g., process- and person-praise), however motivational language has been linked to theories of intelligence. For example, Haimovitz and Dweck (2017), refer to motivational language as theories of how to motivate children. As discussed in their hypothesised theory for teachers' socialisation of beliefs of intelligence to students (see 2.2.2).

Strategy and Comfort Feedback

Closely linked to praise practices (Section 2.4.1), Rattan, Good and Dweck (2012) examined the use of motivational and non-motivational language in feedback to students, examining comfort feedback. In comfort feedback, teachers console students for their lack of ability, using statements such as "it's okay – not everyone can be good at maths" (p. 735), socialising an entity belief. In contrast is strategy feedback, where teachers promote persistence through providing new or reminders of learning strategies. Strategy feedback can be identified by phrases such as "I know you're struggling but you need to look at this a different way by [prompts of strategies]..." (p. 735) and socialises an incremental theory if intelligence. The research by Rattan, Good and Dweck (2012) was undertaken across four studies to explore the use of strategy and comfort feedback in relation to intelligence feedback, with 230 USA university students.

In studies 1 – 3 students (non-teachers) completed measures of beliefs (including intelligence beliefs, maths belonging, maths enjoyment and usefulness of maths). Participants were placed in the role of a teacher - by asking individuals to imagine they were teachers. All participants responded to varying hypothesised scenarios, in relation to implicit intelligence feedback and teaching scenarios, including student successes and failures in learning. Entity theorist 'teachers' in were more likely to comfort students and therefore "engage in pedagogical practices that could reduce engagement" (Rattan, Good & Dweck, 2012, p. 735). While additional results from study 3 indicated that entity theorists were also more likely to hold lower expectations for students following one early poor performance, compared with incremental theorists ($B=.45$, $t(36)=3.04$, pb.01). Comparing strategy and control feedback, strategy orientated feedback resulted in more positive perceptions of teacher investments and expectations ($t\,(51)=-2.82$, pb.01). Thus, indicating if this were to be applied in-situ, students of entity teachers may be less motivated, as a result of the intelligence feedback they receive from their teachers.

Limitations in Literature

Despite findings, in relation to the predetermined expectations based on belief (e.g., lower for entity teachers), there are various limitations within the research. None of the participants within the study were teachers, rather participants were placed in the role of teachers (studies 1, 2 and 4) or were university teaching assistants or instructors (study 3). This causes issues in relation to application to practicing teachers, as evidence is not from actual teachers and poses difficulties in providing evidence for naturalistic instruction, where behaviour may vary, given the context (Buehl & Beck, 2014). Rattan, Good & Dweck (2012) do acknowledge issues in using hypothetical scenarios, stating that it is important for future work to explore actual intelligence related feedback communicated by teachers and the real-life interactions of teachers with students. Consequently, the work of Rattan, Good & Dweck (2012) was used to provide a foundation for intelligence feedback as a motivator, which may be viewed in teacher intelligence feedback and examined using strategy and comfort feedback from the literature.

Codes

In their review of research of school-interventions, Lin-Siegler, Dweck & Cohen (2016) note that classroom teacher's practice (e.g., intelligence feedback) predicts children's motivational outcomes (see Park, Gunderson, Tsukayama, Levine & Beilock, 2016 and 3.10.3). However, on the whole, the study of teacher's intelligence theories and intelligence feedback is in response to hypothetical scenarios, which is not a representation of in-situ practice. Using observations to explore intelligence beliefs and intelligence feedback, would be beneficial to the current literature which examines intelligence feedback as a motivator. In light of findings, which indicate teachers may motivate or de-motivate students through intelligence feedback, motivational language was included in the categorisation guide (e.g., ML). General motivations, such as "shh", "be quiet", "keep going" were also included, as linked to the previously discussed work of Pinter et al. (2015), to determine the role of motivational feedback in naturalistic settings.

Strategy feedback was labelled as SF, which is incremental intelligence feedback. Instances relate to teachers providing strategies for development of work during failures. While CF in the observation guide related to the comforting of pupils, an entity intelligence feedback practice (Rattan, Good & Dweck, 2012). Teacher use of strategies is also linked to degree of challenge (C). For example, where teachers' chose to challenge students following success of work (e.g., incremental feedback) or allow them to do easier work as a reward (Dweck, 1999) (see Table 3.3 and Section 3.10.3). However different in that challenge is usually a precursor to strategy feedback. For instance, teacher provided a challenge task, student struggles, teacher provides strategy/comfort feedback.

3.10.3 Ability Intelligence Feedback, Grouping and Challenge (Observational Codes: Fb-, Fb+, F/E, C)

Another area closely related to theories of intelligence and teacher practice is the use of ability intelligence feedback within the classroom. Ability intelligence feedback differs from motivational intelligence feedback. Ability intelligence feedback directly refers to an individual's level of ability. For example, if a student is labelled gifted and talented (e.g., possessing a natural talent in a subject) and class-setting on ability (e.g., high-, mid- and low-set). When reviewing teacher intelligence feedback in maths, Boaler (2013) presents a framework of intelligence feedback which occurs implicitly (e.g., ability implied) and explicitly (e.g., ability is direct) to students. Boaler (ibid) notes that grouping student classes by ability, according to formative measures (e.g., ability comparisons between lowest and highest performers) is detrimental. Particularly as ability grouping and feedback of whether a student is average, below-average or above-average can predetermine student effort. Ability grouping can also affect teacher perception of student effort, setting pre-determined expectations which may be lower or higher in accordance with a high/low grouping (e.g., low expectations for lower ability classes). Therefore, ability intelligence feedback, whether provided explicitly or implicitly, affects teaching and learning.

The work of Boaler (ibid) was consequently an important area of focus in observations, as related to teacher belief of students, which in turn affects teacher intelligence practice. For example teacher increased challenge for higher-ability grouping and less challenge for low ability students (e.g., (C) in the observation guide). Furthermore, Dweck (1999) suggests where teachers fail to provide additional challenge, whether as a reward for finishing work or because of expectations, an entity message is socialised as students are not challenged. Students who do not experience challenge are not provided with opportunities to experience failure or hard work. While teachers who regularly set demanding work, challenge pupils to increase their effort in order to attain, thus, socialising an incremental theory of intelligence.

Giftedness, Intelligence Feedback and Student Self-Handicapping

Examining the role of intelligence feedback, Snyder, Malin, Dent and Linnenbrink-Garcia (2014) explored teacher labelling students as *gifted* (e.g., possessing a natural talent/ability to succeed in a subject or subjects) and subsequent student self-handicapping following intelligence feedback. The research aimed to investigate the causal pathway of underachievement in gifted students, through the intelligence feedback they received. The sample was purposive, targeting an elite university in order to recruit students whom were more likely to be viewed as gifted, by self and others, due to their attendance at a private university ranked in the top 10 in the US. Of their sample, consisting of 108 students, 78 self-reported their possession of giftedness, indicating that a high proportion of students (72.2%) believed they were gifted.

The research by Snyder et al (2014) was undertaken using an experimental design, whereby students were randomly grouped into four types of feedback scenarios. The scenarios consisted of an intelligence feedback, then success or failure. The four conditions were: entity feedback-failure, entity feedback-success, incremental feedback-failure, and incremental feedback -success. Intelligence feedback were communicated through explicit feedback. For example, giftedness suggests ability is strongly fixed and thus associated with entity theory. While placing emphasis on achieving through high levels of hard work required and persistence, is associated with incremental feedback. Once assigned to groupings, researchers administered a series of problems (not provided in research), with feedback framed as either entity or incremental following success or failure. Students were then provided the opportunity to self-handicap following feedback.

Results from the study indicated that those receiving entity intelligence feedback and experiencing subsequent failures were most likely to self-handicap. Those receiving incremental intelligence feedback, rather, were buffered against self-handicapping, including the incremental-failure group. Findings also demonstrated that female students were more likely to self-handicap following failure when they had received entity intelligence feedback, relative to their male counterparts. Thus, suggesting that female students are more susceptible and at risk of self-handicapping following specific types of intelligence feedback. Similarly, research indicates that teachers have an altered perception of students' labelled as gifted and that practice differs when engaged with students categorised a gifted. For example, when responding to 8 vignettes, teachers (primary and secondary, n = 255) and student teachers (n = 91) viewed gifted students as more open to new experiences, more introverted, less agreeable and less emotionally stable; therefore affecting how teachers interacted with these students (Baudson & Preckel, 2013).

Gifted and Talented in England

In England's national curriculum, the labelling of students as gifted and/or talented (G&T) was integrated into schools policies, spanning from 1999 – 2011 (Department for Children Schools and Families, 2008; Koshy & Pinheiro-Torres, 2013). The policy was initially developed to target the top 5% of pupils within schools to stretch and challenge them, as it was believed G&T students were underachieving. The G&T policy was abolished in 2011 nationally, however, and schools were left to decide how best to manage the provisions locally for gifted and talents students. What is important about the impact of G&T programme, is that teachers may still refer to students as gifted and/or talented – based on ability. Consequently, teachers beliefs about student ability and ability based on contextual factors in school, such as setting by ability, is also an important consideration.

Although looking at teacher interactions with G&T students, results from UK primary school interviews (n = 14) with gifted and talented co-ordinators and teachers (n = 284) indicated that educators were uncomfortable with the labelling of students as 'gifted and talented' (Koshy & Pinheiro-Torres, 2013). Research findings concluded that educators stated they were unsure as to how to apply the policy and what defined students as gifted and talented. Labelling of gifted and talented (G&T) were in line with the former G&T programme in the UK (e.g., implemented in 1999 to provide additional provision for high achieving students). It was also noted that teachers found it difficult to differentiate between gifted versus average students, notably through unease about how to define an individual who possess a gift and/or talent. Consequently, researchers highlighted that the provisions needed, from teachers of gifted and talented pupils, may be missed and practices which would promote challenge not implemented.

Codes

To conclude, teachers in England may continue to use G&T in-line with out-dated policy, whilst others are uncomfortable with the term. Given that there is a body of research which explores student labelled as 'gifted', and the previous G&T policy in England, ability intelligence feedback and ability grouping were of focus within the observation guide. Considering the findings presented in this section, ability intelligence feedback (e.g., gifted and talented) may be used by teachers. Labelling of students may cause some conflict in the area of intelligence belief and intelligence practice, which may be dependent on personal and, or, professional beliefs (see Section 2.5). Therefore it is important to consider how teachers use intelligence feedback in-situ. Dweck (2007) reiterates issues with ability intelligence feedback in her work, suggesting that systems which promote the labelling of students as gifted are unnecessary. Particularly when labelling females as gifted in maths, which can result in decreased math scores comparatively to males. Consequently, the labelling of students as gifted, types of intelligence feedback related to achievement and use of challenge, were also included in the observation guide in order to assess these behaviours in practice. The code related to ability intelligence feedback was labelled F/E (e.g., failure/error), with the aim of coding teacher intelligence feedback in response to failures and errors. Although codes Fb- and Fb+ were also related to ability intelligence feedback, through the identification of types of language used in response student success and failure (e.g., criticism and success) (see Section 3.10.1).

3.10.4 Gender Intelligence Feedback

Gender specific motivational intelligence feedback for female and males has also been documented. Drawing upon the work of Dweck (2007), it was indicated that high ability females (e.g., defined by high IQ) are most likely to hold and be damaged by strong self-entity beliefs. Entity theorist females are more likely believe challenge and effort expenditure is associated with lack of ability. Furthermore, females experiencing an initial poor result are more likely to believe they are not gifted in that domain. However, socialising incremental intelligence feedback to high ability females (e.g., "you're achieving because you work hard") alleviates vulnerabilities. Notably, when provided in relation to low performance, stereotype threats and lack of motivation when feeling ungifted (e.g. acquiring a high result instantly with little effort expenditure).

Differences between male and females intelligence feedback and intelligence theories is also document by Gunderson et al., (2013). The researchers in the US studied the types of parental praise (e.g. process or person) received by toddlers (n = 53) ages 14 – 36 months, with implicit beliefs of the children receiving the praise measured 5 years later. Results indicated that parental intelligence belief did not predict child beliefs. In fact, incremental parents were more likely to send entity intelligence feedback. This was a result of parents believing that praising for ability is more likely to result in a child perceiving they are intelligent, through raised self-esteem. The common misconception of praise for self-efficacy is also reiterated across research (Cimpian et al., 2007; Kamins & Dweck, 1999). However, as previously discussed (see 2.4.1), results indicate that this person-praise socialises an entity theory and is detrimental to academic achievement (Rattan et al., 2012; Skipper & Douglas, 2012).

Further findings by Gunderson et al., (2013) indicated that males in the study were more prone to receiving process rather than person praise. Consequently, females were more likely to receive person praise long term, impeding their academic achievement. Higher instances of females receiving person-praise is a potential factor as to why high ability girls are more prone to holding entity beliefs, as entity intelligence feedback is socialised and embedded from young age (Dweck, 2007). Although the research of Gunderson et al., (op. cit.) measured parental belief and praise implications, researchers noted that other prominent adults whom regularly praise children may engage in similar practices (e.g., person-praise for females, process-praise for males). The researchers stated that other prominent adults include teachers, who play a role in shaping children's motivational frameworks through the types of intelligence feedback. In other research, Good, Rattan and Dweck (2012) examined praise intelligence feedback to students in maths (also discussed in Section 3.10.2). Within their work, females were also found to receive more entity intelligence feedback from teachers regarding their role in maths. Most commonly as a result of the common intelligence belief that maths is a fixed ability subject and the stereotype that women have less of an ability than men in this domain.

Despite the research which suggests females receive more person-praise, Macnarma and Rupani (2017), found that gender differences, as well as levels of intelligence, are not consistently associated with implicit beliefs. In their work across three studies participants (*n* = 393) completed Dweck's (1999) intelligence belief questionnaire, a talent mindset questionnaire and a measure of fluid intelligence. The results indicated that women were not more likely to hold one intelligence belief over another, comparable to men, opposing the work of Dweck (2007) which suggests females report higher entity beliefs. While additional analysis by Macnarma and Rupani (2017) indicates that incremental beliefs do not predict achievement, as previous research suggests (Blackwell, 2007). Considering the conflict in the literature, it was important to consider gender specific intelligence feedback. While a code was not included for male and female interactions, as not a type of intelligence belief, the receiver of intelligence feedback was noted. For example, where teachers were interacting with males or females. Considerations to gender could also be discussed further in interviews, if teachers elicited beliefs about individual students based on gender or appeared to be providing specific feedback to different genders.

3.11 Observation Categorisation Guide: Instructional Practices and Learning Environment (Part 2)

An additional area encompassed within the theory of intelligence literature, is the type of instructional practices teachers implement (e.g., tasks and autonomy) and learning environments establish. Instructional practices and learning environments have been associated with socialising specific theories of intelligence, as discussed within this section.

3.11.1 Tasks

Boaler (2013) suggests that the pedagogical tasks chosen by teachers can have additional implications on the types of intelligence feedback socialised to students. For example, greater focus on tasks where answers are right or wrong, defined as closed-questions, in comparison to more open-ended tasks, where answers can be developed, may result in poorer effort. According to Boaler (ibid) student's frequent incorrect answers on closed-questions indicates that effort does not equal results, while open-ended questions create opportunities for future development and promote effort. Teachers should therefore factor in the role of tasks into planning and promote mistakes as "learning achievements" (p. 149). Boaler (2013) also identifies that incorporating more open-ended tasks and positive learning for mastery experiences would result in increased motivation and persistence when facing challenge. Behaviours which are associated incremental theories of intelligence. Tasks set by teachers in video observations in this Doctoral research were therefore noted and discussed in interviews, where appropriate. In the observation table tasks were divided into a separate column, in order to contextualise intelligence feedback to students. For example, “starter activity, students answer closed questions as part of refresher for previous lesson knowledge”. Tasks also structured and contextualised the observations and allowed for an overview of task types in pedagogy across observations.

3.11.2 Autonomy

Theories of intelligence have also been linked to the types of environments teachers create in their classrooms, such as students' level of autonomy (Leroy, Bressoux, Sarrazin, & Trouilloud, 2007), which in turn affects students' intrinsic motivation and engagement (Reeve, 2006). In a study of 336 5th grade (ages 10 - 11) teachers in France, researchers measured teacher intelligence beliefs alongside self-efficacy, perceived work pressures and the perceived degree of student autonomy (authors link autonomy and intrinsic motivation in academic settings) (Leroy et al., 2007). Autonomy in the study, and in relation to teaching, was defined as a form of learning environment.

Results indicated that characteristics of teachers (e.g., intelligence theories and level of self-efficacy) affected student motivation within the classroom through the creation of student autonomous environments. Teachers holding incremental theories also reported a higher sense of teacher self-efficacy (e.g., belief about capability to produce performance to exercise influence over goals, Bandura, 1994). Thus, teachers believing effort plays an important role in students' achievement (e.g., incremental theory) also strongly believe in their own ability to help students progress and have high self-efficacy. While incremental belief also seemed “to be a condition favouring a teacher's perception that his/her own actions can lead to improvements in student achievement" (ibid, p. 539). A direct and negative influence on creating autonomous classroom climates was teachers holding an entity theory. Researchers suggested that teachers holding entity beliefs, results in emphasising tasks which concentrate on competence demonstrations (e.g. performance goals), while relying on more controlling measurements. Consequently, students’ are less likely to be intrinsically motivated in these environments. Level of autonomy was not given a direct code in the observations guide used in this research, rather used to direct interview questions, where appropriate. Comments were added across observations, through comments, in light of the pre-existing research. For example, “students asked to complete assignment individually” “freedom to develop work” and discussed further.

3.10.3 Goal Structure (Observational Code: G)

The final code presented and related to learning environments was goal structure. Research has indicated that goal structure is another area where intelligence theories may shape the preference to adopt one type of goal over another (e.g., entity theorist favouring performance goals and incremental theorists favouring learning goals, Elliott & Dweck, 1998). In addition, goal framing has been linked to the performance of students, as a result of goal structure implications, as discussed in the sections which follow (Cianci, Schaubroeck, & McGill, 2010).

Goal Framing - Verbal Feedback

In the first of two studies by Cianci, Schubroeck, and McGill (2010), random assignment of goal framing (e.g., learning-, the same as mastery-, or performance-goal) was implemented in order to prime undergraduate participants (*n = 113*). Researchers noted self-selecting goals may have resulted in individuals governed by their intelligence theory, therefore random assignment was necessary. Initially participants were required to complete a series of tests (15 reading comprehension questions and 5 analogies) in order to attain results prior to the administration of goal framing. In light of initial tests, participants were provided with verbal feedback, which was either positive (e.g., "you have performed very well") or negative (e.g., "you have performed poorly"). Participants were then randomly assigned one of two verbal primers and asked to view the test as an opportunity to demonstrate either competence (performance goal) or development of knowledge (learning goal), a no-goal condition was also included. Next, participants were asked to complete a series of further tests (again 15 reading tests, 5 analogy tests), in order to measure subsequent performance in light of the primed goal structured previous administered, and received the same feedback administered earlier in the test. The final test was made up of 20-items, followed by a post-completion questionnaire.

Findings from study 1 indicated that those individuals verbally primed with learning goals performed better on reading tests and analogies than those verbally primed performance goals. Positive feedback, however, did not have any effect on the performance of these individuals, or those given the no goal condition. Rather, it was negative feedback to participants receiving learning goals that improved performance. The opposite was true for those primed with performance goals, where negative feedback impeded performance, and rather positive feedback raised performance. Conclusively, study 1 determined that achievement goal type and feedback valance interact to influence change in performance (Cianci et al., 2010).

Study 2 examined negative feedback only, framed in one of the three randomly assigned goal conditions to participants (*n = 122)*. The study replicated the same protocol (test, feedback, goal primer, test, feedback, test, feedback), however with negative feedback only and theories of intelligence measured beforehand. Consistent with previous findings, goal type and intelligence theories were found to align, regardless of intelligence theory held. Individuals primed with learning goals demonstrated greater improvements in score and outperformed those primed with performance goals. While incremental theorists with performance goals outperformed those holding entity theories. From this work, it is suggested that the role of goal choice is related to both theories of intelligence and achievement outcomes, dependant on feedback provided to individuals. Thus, goal structure environments may also hold implications for the types of language and intelligence feedback within classrooms.

Teacher Goal Structure and Pupil Belief

Further research explores teacher goal structure and pupil belief. Park, Gunderson, Tsukayama, Levine, and Beilock (2016), sought to identify the role of intelligence theories in US elementary school children (ages 6-7, *n = 424*) as well as the practices and intelligence feedback of elementary teachers (*n* = 58) in Maths. The study was centred on students' motivational frameworks, defined in a similar manner as meaning systems, where theory of intelligence may lead to specific attributions about success and failure, learning strategies, and outcomes of students in relation to challenge (Dweck et al., 2017). Within studies, however, there was a specific focus on ability belief (e.g., high or low) and task preferences (e.g. challenging or not challenging, for students). Data were collected from students through the measurement of attainment and motivational framework. Teacher data were collected through self-reported instructional practice (e.g., performance or mastery), teachers' content knowledge for teaching maths and teachers' theories of intelligence. Note, learning goals and mastery goals are used interchangeably across the literature, and are goals which are for knowledge development, rather than performance based.

Findings highlighted that how teachers embed their beliefs into teaching practices is important to children's motivational frameworks, rather than teacher's beliefs in isolation. For example through classroom tasks environment, emphasising either performance or mastery of students. In addition, teachers' self-reported practice (i.e., mastery or performance) was not correlated with actual teaching practice and students' motivational framework, however was correlated with intelligence belief. For instance, entity theorists correlated with performance goals, while incremental theorists correlated with mastery goals. Therefore, self-reported practice and intelligence belief were related, but not always enacted in practice. This holds important implications in terms of studying what teacher practices may or may not entail in the classroom, and whether there are specific behaviours demonstrated by teachers, as related to their reported intelligence beliefs.

Observations were suggested by several researchers across the literature surveyed, which was predominately quantitative based, in order to confirm actual instructional practices in pedagogy. Although the findings of research by Park, Gunderson, Tsukayama, Levine and Beilock (2016) provide additional evidence towards intelligence belief-intelligence feedback relationship of teachers, their research was again comprised of self-reports only. The study of goal structure, coded as (G) in the observational guide, and intelligence feedback of teachers' in relation to their intelligence theories in practice was therefore considered and included on the observation guide.

Summary

Consequently, the literature across Sections 3.10 – 3.11 underpins key areas linked to teacher intelligence belief, and a basis for observation of teacher behaviour in naturalistic settings. Teacher intelligence feedback, including entity, incremental and neutral practices are presented in Table 3.3. Literature from the observation guide was also used to underpin the final data collection method, which was semi-structured interviews (Section 3.12).

3.12 Semi-Structured Interviews & Stimulated Recall

The intention of semi-structured interviews was to provide the opportunity for teacher-researcher to discuss the events of the observation and beliefs of teachers in relation to their intelligence feedback and instruction (Given, 2008; Mears, 2012; Wengraf, 2001). The interview took place alongside viewing the observational video footage (e.g., stimulated recall, STR – Section 3.12), with a less structured approach to questioning, identified as the “interview guide approach” (Cohen, Manion, & Morrison, 2011). The semi-structured nature of interview allowed for the collection of data which covered specific topics in-depth (e.g., intelligence feedback, perceived context and beliefs) (Mears, 2012), as well as teacher specific data, following the review of video footage by the researcher. Interviews lasted approximately 60minutes, with one per teacher.

The key consideration to using semi-structured interviews, as opposed to an interview with closed-questions (e.g., pre-determined answers) or standardised open-ended questions (e.g., all interviewees asked the same questions) was in the flexibility of questions (Cohen et al., 2011). Flexibility of questions was vital, given that the context, content and events of each observation differed. Weaknesses of the semi-structured interviews, however, were identified in sequencing and wording of questions as well as inadvertently omitting important questions (ibid). Although attempts were made to avoid weakness, through the creation of the semi-structured interview template, which followed the same outline and categories across participants.

A template for the interviews (Figure 3.6) was derived, in order to provide the researcher with codes related to the observational guide (see Appendix 5 for full template and Appendix 6 for guide). The interview template was considered vital, as each interview was structured in the same format, with discussion of the similar themes. Themes in interviews related to those identified from previous literature, which underpinned observations (e.g., challenge, failure, strategies etc.). A rationale was provided for each question to demonstrate why the question was included, and how data could contribute to overall analysis and answering RQ’s (Section 1.2) – core questions are in column three of Figure 3.6.

Question type and purpose	Potential Code	Questions	Possible prompts	Follow up questions (for clarification/elaboration/detail)	Rationale
Explicit belief	Implicit belief/self-reported belief	Think about an intelligent student you teach, how would you describe this student and their approach to work?	To you, what defines a student as intelligent? You've mentioned attitudes and traits (hard working, high achiever, seeks opportunities to develop) – how would you therefore define intelligence?	Can you clarify what you mean by…	This introduces the subject of intelligence to the teacher and requires them to consider the very definition and the general properties they believe constitute of intelligence. (Dweck, 1999)
Explicit belief	Implicit belief/self-reported belief	Generally speaking, do you believe people have a fixed or changeable amount of intelligence?	Is there a particular reason you believe that? Why do you believe that? Can you explain that further…	You said <INSERT> can you tell me more about how that has shaped your belief?	To be used in conjunction with self-reported belief on teacher questionnaire and messages within observations (Dweck, 1999; De Castella 2015)
Potential opportunity for video recall	Motivational Lang	In the observation you state <INSERT COMMENT>, what is the aim of this feedback? What types of feedback would you give to students to motivate students?	Is this type of feedback/language the same for all students? (e.g. more able, SEN, class sets) Why have you used <Insert sentence/wording of feedback>?	Can you describe an instance where you have motivated a student? What type of student were they?	Discussion of purpose of feedback to student's and ways teachers attempt to motivate students through language. Lin-Siegler 2016; Gutshall 2016
Potential opportunity for video recall	Challenge/Speed of completion	At this/these point(s) in the video <INSERT INSTANCE> a student finishes their work and you ask them to <INSERT COMMENT>, why is that? What do you do when students finish their work or a task quickly? Here you have said <example: whoever finished first will get a merit> why is it important for students to finish fast?	Is it important to get work finished quickly? Do you provide any particular types of rewards? Is this the same for all students, or dependant on set/ability?	Is there a particular instance/example you can think of?	Explore teacher's thoughts in relation to the speed of completion and next steps provided/not provided for student(s). Dweck 1999; Snyder 2014; Gutshall 2016

Figure 3.6 Example of Interview Template

The interviews included asking teachers' for context, teachers definition of intelligence, direct questioning about the nature of intelligence (e.g., fixed/growth) and discussing specific events of observations (see Appendix 7 for full details). Although each interview followed a similar format, there was enough scope for prompting and probing, which allowed for the exploration of specific events in depth, unique to each teachers interview/observation. It was expected that not all interviews would have examples of all codes, given observations varied in subject and content, therefore if feedback, a behaviour or event was not present in the observation it was not discussed in the interview. The main purpose of the interview was to discuss events through STR, in order to explore intelligence beliefs, language and teacher attributions for their own behavior. Given that the beliefs of teacher's have been identified as part of a broader system (Pajares, 1992), it was deemed important to the researcher to allow for other beliefs to emerge through interview (e.g., beliefs about students). This would provide an opportunity to explore other beliefs which may be interwoven with teachers' intelligences belief, as other beliefs are noted as a contributing factor to teacher intelligence feedback (Haimovitz & Dweck, 2017; Rissanen et al., 2018a)

3.12.1 Stimulated Recall in Interviews

Reviewing the video recorded observational footage was guided by the observation categorisation guide. The interview provided the opportunity to explore teacher attributions for their own behavior and intelligence feedback, with teachers watching categorised events, using video reflection. The use of video reflection is a common tool in teacher research, in order to access teacher thinking on practice; with the method labelled by some as stimulated recalled (STR) (Cross, Rapacki, & Eker, 2014; Moyles et al., 2002; Skott, 2014). Stimulated recall occurs when individuals watch past events, which have been recorded, in order to stimulate thinking and provide evidence for events. The aim of STR is to stimulate recall of events through playback of video recorded events (ibid). In educational research specifically, STR has been used as common reflective tool for exploration of teachers' belief and behavior (Davies, Kiemer, & Meissel, 2017; Davies, Perry, & Kirkman, 2017; Rissanen et al., 2019; Tripp & Rich, 2012). STR is also understood as particularly important tool in teaching, as teachers are faced with multiple decisions and may not always remember events across lessons. As a result, STR provides a means for teachers to view behaviour directly.

It has also been reported that individuals can evaluate evidence in a way which is bias toward their own beliefs, termed myside-bias beliefs (Stanovich, 2013). For example, Stanovich (2013) indicated that individuals are likely to believe their own interpretations of an event are more accurate than an observer's. Interviews using STR therefore provided the opportunity for teachers' to verbalise attributions for their decisions, while presenting key evidence of behaviours which teachers may not have been aware of. Reviewing the literature, it was decided that the use of STR in the interview would be useful in examining teacher attributions for behaviours, and if behaviours and attributions aligned with self-reported beliefs of intelligence. Events to discuss with participants were chosen through reviewing the video observations and coded material, identifying most explicit examples of behaviour and feedback.

3.13 Methodological and Interpretative Rigor

Through the collection of data using the methods outlined above, the aim was to gain insight into the inner experience of teachers and further explore how individual meanings are formed in relation to internal (e.g., beliefs) and external (e.g., school ethos) factors (Buehl & Beck, 2014; Corbin & Strauss 2008) (also see Section 2.6.1). Furthermore, the methods within this study were chosen to uncover the role, if any, of teachers' beliefs of intelligence in relation to their intelligence feedback. It was anticipated that data yielded would go beyond the scope of the research questions and potentially be complex, given the domain of teacher beliefs. Therefore a two phase approach was taken towards data analysis (Sections 3.14.1 and 314.2). Phase one was concerned with answering the RQ's, whilst phase two analysed and reported on all data, which existed beyond the RQ's. It was hoped that yielding rich data, through the observations and interviews employed, would also assist with unpicking the 'messy' construct of teacher beliefs in intelligence beliefs, as previously described by Parajes (1992) (see Section 2.6.1).

Although the mixed-method approach of the study is identified as 'complementary', through a combination of approaches (see Section 3.4), a complementary approach does not indicate rigor. Rather, qualitative research quality is dependent on methodological and interpretative rigor. Methodological rigor is defined as good conduct within research, for example transparency of methods and clear presentation of methods (Fossey, Harvey, McDermott, & Davidson, 2002). While interpretive rigor pertains to the trustworthiness of interpretations, achieved through observation guides, triangulation, and participant clarification of behaviours in observations (ibid). Without rigor, evaluation of data and claims from the research can be hard to believe, thus clarity and transparency is key across qualitative research (Olfson, 2014). In order to explore and identify rigor within the present Doctoral study, the exemplary qualitative studies table (Table 3.4) by Olafson et al. (2014) was used to draw comparisons (pp. 143 – 144). Columns 1 and 2 reference methodological rigor, while 3 and 4 address interpretive rigor – as identified in this study:

Table 3.4 Comparisons of Exemplary Qualitative Study

Methodological Rigor in literature Olafson et. al. (2014)	*Evidence in Doctoral Study*	*Interpretive Rigor in Literature Olafson et. al. (2014)*	*Evidence in Doctoral Study*
Multiple data sources	Questionnaire (3.7), observations (3.8), interviews (3.12)	Multiple data sources & Triangulation of data	Used in analysis of data (3.14)
Coded examples provided	Evidence in text (chapter 4) and appendices	Participant clarification/member-checks	Discussion of observational behaviours/intelligence feedback in interviews with teachers (3.12, chapter 4)
Clear descriptions of procedure	Procedures described across chapter 3	Reference to guides	Guide created and utilised to interpret teacher behavior (3.9/3.10)
Analysis of themes	Chapter 4 and Appendices	Reflexive approach	Decisions made in reference to researcher reflexivity 3.2.1
Concept mapping	Observation guide and underpinning literature (3.9/3.10/3.11)	---------------	---------------

Olafson et al (2014) suggest "one of the greatest issues facing qualitative approaches is the need for methodological clarification" (p. 145). This Doctoral research therefore demonstrates methodological and interpretive rigor, achieved through the points identified above. All methods use were underpinned by the literature, while acknowledging and addressing limitations. Particularly, attempts were made to off-set methods against one another to measure teacher beliefs and behavior in relation to intelligence (Section 3.4).

3.14 Analysis

In order to guide the analysis of data, both thematic analysis (TA) and abbreviated grounded theory (AGT) were chosen. Phase one analysis (Section 3.14.1), which answered the RQ's, was undertaken using TA. While phase two analysis (Section 3.14.2), applied AGT and also included TA. The decision to select two forms of analysis was made in relation to the type of data collected, research questions and researcher stance. As the data was anticipated to yield themes which existed outside of the scope of the research questions (e.g., teacher's identifying additional beliefs and attributions for their intelligence feedback), it was considered important not to ignore additional data – as noted by Braun and Clarke (2006). Consequently, AGT was selected to explore the themes yielded external to RQ's and provide evidence for a hypothesised theory (see Chapter 6). A modified version of grounded theory, for the purpose of analysing additional data is discussed further in Section 3.14.2. To provide clarity, the figure (3.7) below summarises how all the data in this Doctoral were analysed:

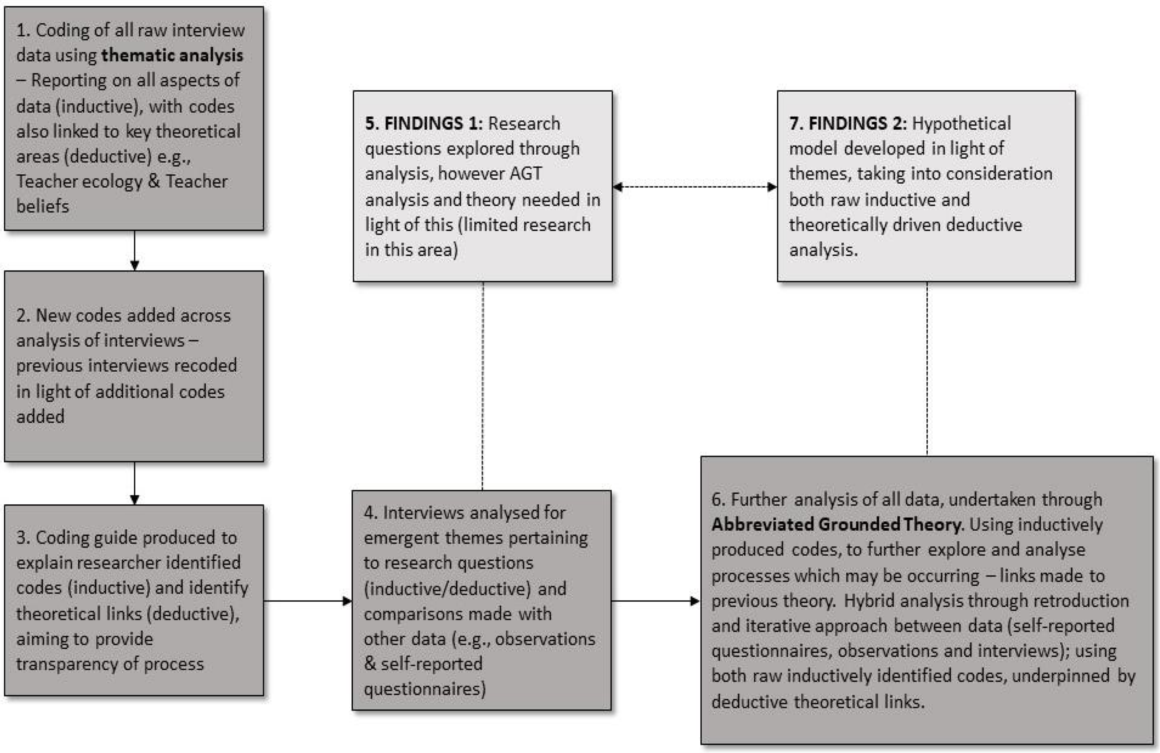

Figure 3.7 Summary of Data Analysis

Figure 3.7 presents how the findings were uncovered in relation to the research questions (e.g., 'findings' 1 in Figure 3.7), as well as how data were used in AGT to generate a hypothesised model of the intelligence belief-intelligence feedback relationship (e.g., ‘findings 2’ in Figure 3.7). Both findings 1 and 2 were underpinned by the data collection methods presented across Chapter 3. Section 3.14, which follows, details the analytical procedure for findings 1 (RQ’s) and 2 (hypothesised model).

3.14.1 Phase One Analysis: Thematic Analysis (TA)

Within their work, Braun and Clarke (2006) describe TA as a “foundational method of qualitative analysis” (p. 4). TA is argued as a valuable form of qualitative data analysis due to flexibility and detachment from theory (ibid). TA differs from more theory driven qualitative analysis (e.g., grounded theory, interpretive phenomenological analysis and discourse analysis), where researchers are more commonly guided systematically (Willig, 2013). Despite disassociation with systematic procedures, TA does share a common feature of other methods (e.g., grounded theory, interpretive phenomenological analysis (IPA) and discourse analysis) due to emergent theme identification across data. Although thematic analysis is understood to be flexible, Braun & Clarke (ibid) provide clarity, theoretically and methodologically, through a six-phase guide (see Table 3.6). Broadly speaking, TA is an analytic method used for the identification of themes and subsequent reporting of qualitative data. TA also provides the opportunity to go beyond surface data, by exploring deeper meanings of data, through researcher interpretation, definition of terms and transparency of analysis. Identifying themes specific to the RQ’s was possible through deductive analysis, underpinned by previous literature and theories (see Section 3.14.3), and thus TA was considered a viable form of data analysis for this research.

Terms and Phases of TA

Within their work, Braun & Clarke (2006) note the importance of clarifying procedures within thematic analysis. Notably, as previous researchers have failed to fully describe their approach to qualitative analysis. Lack of clarity can make comparison or synthesis problematic for other research replication. In an attempt to avoid a lack of detail, this section presents the entire analytical process of the research, using TA. To provide clarity of terms for readers unfamiliar with TA, the table below (Table 3.5) summarises Braun and Clarke’s (2006) definitions. Definitions are compared to the methods used within this Doctoral research, with the aim of demonstrating the relationship of data collected and thematic analysis terminology in parallel.

Table 3.5. A Summary of Thematic Analysis Definitions

Data type	*Definition*	*Method Example - Aligned to Doctoral Study*
Data Corpus	All data collected across research	Questionnaire data from 10 teachers, 10 coded observations data and 10 transcribed interviews
Data Set	All data used for analysis from Data Corpus	Individual method (e.g. 10 interviews)
Data Item	Individual piece of data	Individual interview
Data Extract	Chunk of coded data	Coded text from interview

Following on from terms, Braun & Clarke (2006) identify the procedures involved in TA, which are used to ultimately report findings of data. Table 3.6 summarises each of the six phases of the guide, as suggested by Braun and Clarke (2006), including the title of each phase, definitions, guidance and the application in this research. The aim of the table is to summarise the analytical process for answering the research questions using TA, and the steps taken in this Doctoral research (column 4 – Steps taken in analysis of this Doctoral research):

Table 3.6 Summarising Six-Phases of Thematic Analysis

Phase	*Title*	*Definition/Guidance*	*Steps taken in analysis of this Doctoral research*
Phase 1	Familiarising self with data	Immersion within data for breadth and depth Repeated reading Familiarisation of all data Search for patterns	Self-transcribed interviews – verbatim Coded observations in line with literature Repeated readings of entire data set before coding Systematical notes
Phase 2	Generation of initial codes	Involves production of initial codes Organisation of data into meaningful groups – create as many codes as possible Full and equal attention to each piece of data	Manual coding and Nvivo word frequencies Identification of key and reoccurring aspects within data – continued in systematical notes, collated manually and highlighted across data Overall conceptualisation of data patterns
Phase 3	Searching for themes	Refocus on broader themes from smaller codes Use of visuals "Miscellaneous themes" – can be potentially used at a later date	Consideration of connection between codes – developed into larger themes Mapping of codes and themes Systematic approach – all data and analysis retained
Phase 4	Reviewing themes	Begins when "candidate" themes have been identified (p. 20) It will become evident which themes are most salient Meaningful coherence between themes – if necessary Themes can be reworked Two levels of reviewing and refining – 1. Read collated extracts and consider patterns in individual data items, move onto second level if so. 2. Same process in relation to entire data set. Recoding at this stage is expected as part of the process	Refinement of themes Grouping of similar themes – identified through mapping Reflexive approach Themes and codes considered – additional codes added where needed Use of thematic map
Phase 5	Defining and naming themes	Begins when thematic ideas are mapped Define and refine Consider how themes fit into the overall picture Consider relationships Name themes for final analysis	Definition of codes – what does code capture in relation to data Presentation of what is thematic and why Creation of sub-themes Each theme presented in detailed analysis
Phase 6	Producing the report	Begins when themes have been fully worked out Provide account – which is clear, concise, coherent, logical and evidence based Embed extracts into analytical write up	Present data extracts alongside themes and details Extracts identify the themes and evidence Arguments made in relation to RQs from evidence of TA

As the data collected within this study contained questionnaires, coded observations and transcribed interviews, this was identified as the data corpus. The observations were coded using the observation guide, and therefore analysis of observational data took place through the identification of intelligence feedback pertaining to the guide (see Section 3.10). However, a summary of each lesson was also undertaken, which presented frequencies of each code and a general conclusion of the teacher's lesson in relation to the RQ's (see Appendix 10 for example). Conclusions were made in relation to intelligence feedback and the theory of intelligence literature. It was the interviews which were coded using TA, while video observations were referenced to match with self-reported belief, intelligence feedback (in observations) and interviews.

Application to Doctoral Research Study

The purpose of TA was to answer the research questions, therefore codes and themes were identified in relation to RQ's, as well as inclusion of additional codes which were outside of the scope of the RQ's. The inclusion of all codes (e.g., reporting and defining in Appendix 12), irrespective of their use in findings, is suggested by Braun and Clarke (2006), as codes may provide insight into the overall picture of data (phase 5). To begin analysis, individual interviews were analysed using TA in Nvivo. Individual interviews yielded initial codes, through data extracts (e.g., small sections of text). Where new codes arose from additional data items, new codes were added, then previously coded interviews re-coded in light of new codes. Following this, analysis took place on a larger scale, where data corpus (all interviews) were analysed to identify salient codes, which generated themes. Various themes emerged, some of which related to the RQ's, while others existed external to the RQ's. Analysis was also undertaken with individual participant data (e.g., 1 questionnaire, 1 coded observation and 1 transcribed interview) which was useful for concluding if intelligence beliefs and intelligence feedback were aligned (RQ1). Examples of analysis can be seen in Appendix 8, which details the TA procedure for participants 1 – 3 in the pilot study. Analysis of participant data for all participants followed the same procedure, as outlined in Appendix 8. Appendix 12 outlines codes and themes of the data. It was also possible to use TA to identify emergent themes of all teachers, when considering and comparing all of individual data items.

To summarise, the entire TA process required the researcher to consider individual participant data in the first instance which yielded initial codes, before viewing codes across participants to form the overall themes related to the research questions. Presentation and further details of the process are provided in the research findings, where codes and themes are explored (see Chapter 4).

Limitations of Thematic Analysis

As with any form of data analysis there are potential limitations to TA, which are identified by various authors (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006; Willig, 2013). Limiting considerations across the process of TA are multiple. Therefore to address limitations researchers must make attempts to ensure all data collected is used, avoid the use of themes identified from interview questions (rather than the data itself), present weak themes which do not appear to work given the data, and avoid misalignment between data, theory and analytical claims (Braun & Clarke, 2006). Across the process, these limitations were considered and addressed where appropriate, for example ensuring all data collected was coded and underpinning codes with previous literature (e.g., through the observation guide – Sections 3.9, 3.10 and 3.11). In addition, as this research is a Doctoral study, the video data were coded by one person, the researcher, and discussed with the supervisory team (as in Fereday & Muir-Cochrane, 2006). This decision was made in relation to ethics, as video data caused a potential viewing of students. As the researcher was only given access to the data. While the coding process was undertaken by one researcher, which provided consistency across analysis, analysis through TA lacked the multiple perspectives others could bring. Therefore the observation code was vital to the underpinning of the analytical process in observations, as codes were related to pre-determined themes from literature and corroborated with teachers in interviews.

Points related to a successful TA implementation, include clarity of procedures, interpretations rather than descriptions and alignment between procedural descriptions and analysis (Braun & Clarke, 2006). A 15 point checklist of criteria for good thematic analysis is also provided by Braun and Clarke (2006) and was referenced across the analytical process (e.g., transcription, coding, analysis etc.). The checklist included points such as, ensuring "all relevant extracts for all each theme have been collated", "analysis and data match each other – the extracts illustrate the analytic claims" and "enough time has been allocated to complete all phases of the analysis adequately, without rushing a phase" (Braun & Clarke, 2006, p. 32). The checklist was referenced throughout the analytical process.

3.14.2 Phase Two Analysis: Abbreviated Grounded Theory

The second form of analysis within this study was identified as abbreviated grounded theory (AGT), a modified approach to traditional Grounded Theory (GT) (Willig, 2013). Forms of Grounded theory (GT) have been described as connected to TA, in that analysis takes place on a detailed level where themes may emerge. However, the expectation within grounded theory is to present a theory from all data, while the purpose of using TA in this research was to only answer the research questions. Theory generations can be achieved in GT through deductive, inductive or retroductive analysis, and again, data is coded and categorised (e.g., themed) (see Section 3.14.3).

Grounded Theory vs. Abbreviated Grounded Theory

Abbreviated grounded theory is described by Willig (2013) as the process of analysing an entire data set, without the collection of further data. This case be as a result of limited time or access to further data, as was the case in the current study. While maintaining key elements of traditional grounded theory (e.g., coding and constant comparison of data) saturation can only be achieved within the data collected, thus, a limitation of the approach (ibid). Using AGT in the current Doctoral research, data were analysed as collected, although this did not inform the RQs for a next phase of data collection in an iterative fashion. Data was analysed across collection for expediency, as opposed to a deliberate analytic strategy, to inform subsequent RQs. Data was then revisited following individual participant analysis, in order to compile and explore common categories.

The analytical approach of AGT was chosen following thematic analysis in order to provide evidence for theory, which was generated as a result of the data collected. Again, this is where TA differs, as the entire purpose of grounded theory analysis is to present a theory. That is not to say TA cannot generate theory rather, traditionally, grounded theory follows a set of analytical procedures in order to present theory from data (Bryan, 2007). In particular, the basic components of GT approach are outlined by Henwood & Pidgeon (1992) as identifying the "similarities and differences which exist between instances, cases, and concepts, to ensure that the full diversity and complexity of the data is explored" (p, 104). Further key features of all GT, originally present by Glaser and Strauss (1967), are understood as follows:

- **1. Theoretical Sampling** – this is the process of collecting data which is to generate theory, specific to the theory under development. Researchers can collect, code and analyse data, while continuing to select samples based on the development of a theory. In this sense, data collection is controlled by theoretical development and is therefore an ongoing process.

- **2. Coding** – Coding data is achieved through the identification, organisation and labelling of data, which can be used to underpin theory. These are usually significant to the theory or research under investigation and can be revised and developed if appropriate to theory.
- **3. Constant comparison** – Closely related to the use of codes in grounded theory is the constant comparison between data and theory. This requires the researcher to regularly compare codes, and adapt where necessary, in order to present emergent theoretical elaboration.
- **4. Theoretical Saturation** – Theoretical saturation in grounded theory pertains to the coding of data, and is reached when new codes are no longer emergent from data. When all data has been coded and there are no additional codes, this indicates that codes are well developed and codes are established and validated. Notably, "a category operates at a somewhat higher level of abstraction than a concept in that it may group together several concepts that have common features denoted by the category" (Bryman, 2012, p. 421).

Researcher argues 'true' grounded theory can be restricting, in that researchers are required to follow an exact set of procedures (Braun and Clarke, 2006). This can result in "methodolatry" (ibid, p. 28) where a researcher is tied to a committed to method rather than using the most appropriate method or methods which appear to be best fit in relation to research questions. Bryman (2012) also notes that defining grounded theory can be difficult to achieve, predominately as a result of differing opinions and approaches, and rather it is more commonly understood in terms of key features (as identified in the 4 points above). In light of such complexities and potential limitations (e.g., methodolatry and inappropriate analytical procedure) the grounded theory analysis in this research was a version of true grounded theory (e.g., abbreviated grounded theory).

The decision was made to apply a second form of analysis in order to explore data which would appear outside the scope of the RQ's. When coding data through TA, it was also clear that there were emergent themes connected to the teacher intelligence belief-intelligence feedback relationship. The identified themes were important to the RQ's, to provide an overall picture (Braun and Clarke, 2006), however, not always directly related to RQ's. TA also had links with AGT through the identification of codes and groupings of these codes, termed 'themes' in TA and 'categories' in grounded theory (Willig, 2013). As previously noted, a broader category in relation to grounded theory, is salient when the category relates to smaller codes which can be grouped – identified as emergent themes in TA (ibid). In the analysis of data for phase 2, terms associated with AGT are used (e.g., "categories" as opposed to "themes" in thematic analysis), although it is understood that there are overlapping features of the two analytical approaches taken.

The key difference between TA and AGT, however, is in the use of data in the coding process. Data and coding in AGT requires conceptualisation and abstraction of theory, which is underpinned by the categories. Coding results in concepts, which arise as data is coded. Codes are constantly compared (e.g., constant comparison – point 3) for connections between data and theory, resulting in categories. Relationships can be explored between categories, which may produce a hypothesis, additional sampling or data collection (if following true GT). When thematic saturation is reached (e.g., no new codes or categories – point 4), and abstraction and conceptualisation of all data is achieved, this results in a formal theory (Bryman, 2007). As a result, the aim of the second phase of analysis using AGT, following thematic analysis, was to generate a theory which would conceptualise teacher intelligence feedback in relation to teacher intelligence beliefs and wider points raised by teachers (e.g., context – see Chapter 6). This is why phase two was deemed appropriate for analysis and key to fully exploring the data.

Analytical Procedure of Phase Two of this Doctoral Study

Theory generation was achieved through AGT in interviews, in combination with questionnaires and video analysis. The analytical procedure for phase two (theory generation) was as follows:

1. Coding in the interview data began during the first phase, during thematic analysis and data were coded as collect (as recommended in grounded theory, Bryman, 2012). Codes generated across thematic analysis were identified using all data, some of which were external data in relation to the RQ's. As a result, data existed which began to emerge as additional attributions for teacher intelligence beliefs

and teacher intelligence feedback (e.g., relationships with students). Consequently, in phase two of analysis (abbreviated grounded theory) data and codes were read through again to ensure there were no additional codes which could be produced from data.

2. The identification of both codes and larger categories allowed for comparing and linking ideas as they emerged, in line with AGT. This was achieved through the analysis of individual interviews, followed by larger comparison of all teacher interviews – thus, constant comparison (see below).
3. Categories in interviews were linked further through constant comparison between data. Once saturation was achieved in interviews, questionnaire and observational data were included to explore relationships of data. At this point, it was possible to explore how far intelligence feedback related to intelligence beliefs and other attributions teacher made for their intelligence – which again was beyond the scope of the RQ's.
4. Abstraction and conceptualistion of categories were explored, with theory generated from all data, through linking questionnaires, observations and interviews.
5. The decision was made to further explore literature which may underpin the theory, and consequently the literature was useful in clarifying abstractions of concepts (see Chapter 6).
6. The final stage was final theory presentation (Section 6.2).

In order to provide quality of analysis and "good" qualitative research within a GT approach, the researcher referenced Henwood & Pidgeon's (1992) criteria, which highlighted key areas for consideration. As suggested by Henwood & Pidgeon (ibid), the AGT analysis included:

- A definition and summary of the researcher's codes, categories and themes (see Appendix 12) for transparency
- Presentation and abstraction of the final theory (see Chapter 6) with considerations to the various levels of interactions of participants and context (e.g., teacher ecology)
- A reflexive approach to the research (see Section 3.2.2)
- The creation and representation of "joint reality" (p. 106) with participants (e.g., using multiple data methods to corroborate findings)
- Reporting of contextual features, which may affect transferability of the study (e.g., reporting on teacher demographics and school contexts – see Appendix 9 for School Profiles)

Thus, the approach of AGT analysis was considered appropriate to explore data and present theory, as the researcher undertook steps suggested by authors to ensure analysis was suitable for in-depth abstraction and theory generation (Bryman, 2012; Henwood & Pidgeon, 1992; Willig, 2013).

Limitations of Abbreviated Grounded Theory

Although widely used in qualitative research, there are various limitations to grounded theory, notably, prior influence from pre-existing theories (Bryman, 2012). Prior influence, however, may be useful in understanding processes of theoretical development and allow researchers to build on previous work. The decision was therefore made to underpin theory with literature following AGT analysis, in order to build on previous work. Practical issues (e.g., time and recruitment) may also arise when applying grounded theory, as was the case in this Doctoral research, thus resulting in the abbreviated grounded theory analysis. Ideally more participants would have been selected in order to test the hypothesised theory and return to the field, however, given the time constraints of the PhD, qualitative data collection and subsequent data analysis, it was not possible to include additional participants. Furthermore, grounded theory definitions in the literature vary, which is why abbreviated grounded theory was chosen. Abbreviated grounded theory in phase two of this Doctoral study drew upon key concepts of grounded theory, while definitions were made clear and linked to TA. Despite limitations, grounded theory is described as an influential strategy for conducting qualitative analysis (Bryman, 2007) due to the processes proposed (e.g., coding, categorisation and emergence of theory from data) and therefore was deemed appropriate for the second phase analysis.

3.14.3 Inductive, Deductive and Retroductive Analysis

To provide further clarity across the process of the analysis, this Section discusses the analytical approaches across phases one and two. The identification of themes and codes was achieved by employing a selection of approaches to both coding and analysing, using inductive, deductive and retroductive analytical approaches.

Inductive coding is predominately concerned with coding everything within the data, in order to explore data in detail. Consequently inductive coding is detached from theory and concerned with analysis from a bottom-up approach (e.g., abbreviated grounded theory) (Fereday & Muir-Cochrane, 2006; Willig, 2013). Deductive coding, however, may employ a template or pre-conceptions derived from theory and literature, therefore coding and identified themes are based on this (ibid) (e.g., thematic analysis and observational guide). Finally, retroductive analysis takes a spiral approach of inductive and deductive (see below), moving back and forth iteratively, while also concerned with structures and mechanisms (e.g., combination of thematic analysis and abbreviated grounded theory). Retroductive analysis was an important feature of model generation, in Chapter 6, as directly related to critical realism (see Section 3.2), which underpinned the researchers approach to this Doctoral study.

Merging both inductive and deductive analysis is widely discussed by Fereday and Muir-Cochrane (2006), where a hybrid approach to analysis was applied to a doctoral study in exploring nurse's self-assessment and performance feedback. Although outside of the topic of this study, the authors analysis of data were useful to explore, given that there are limited qualitative data analysis within theories of intelligence literature. The hybrid approach in Fereday and Muir-Cochrane's (2006) research allowed for balance between deductive and inductive coding, which was found to provide rigor, addressed the research questions, and underpinned presentation of themes generated from raw data. Blaikie (2003), however, notes that a combined process of deductive and inductive approaches can still be problematic, as the combination fails to include the social construction of social reality. While retroductive analysis addressed the social construct. Retroductive analysis is therefore argued as better suited for social research, as retroduction analysis can assist with finding and developing ideas within the data that are linked to social constructions (ibid).

Retroduction analysis is a cyclic or spiral processes, rather than linear, with the overarching aim of retroduction to arrive at the structure and mechanisms, which may assist with the explanation of observed irregularities (ibid). As an element of this Doctoral study involved the generation of a hypothetical model, socially contextualised by collective norms and school context through teacher ecology (see Sections 2.6 and 6.2), the retroductive analytical process was employed, understood as the logic of reduction. Retroductive logic proposes hypothetical models and structures, as derived from empirical results (Blaikie, 2003). The retroductive logic was applied in theory generation of this Doctoral study, although originally guided by a framework of abbreviated grounded theory analysis (see Section 3.14.2). Analysis retroductively therefore seeks to include both empirical facts as well as theory in order to explore patterns in research, which in turn present understanding in relation to inquiry

(Alvesson & Skoldberg, 2009). More specifically, the use of empirical matter combined with theory provides the opportunity for development and exploration of new theories. New theories can be embedded in previous research, whilst researchers undergo a continuous reflexive process (ibid, see Section 3.2.2). Using retroductive analysis was therefore reflective of the researchers philosophical stance of critical realism (see Section 3.2.1), as theory generated through retroductive approach was subject to change across the reflexive process.

Seven Points of Retroductive Analysis

Blaikie (2007) proposes a retroductive research strategy in seven points. To summarise the seven points, in order to make an attempt at discovering structures and mechanisms, a model must be constructed where structures and mechanisms are currently unavailable or deemed insufficient. If the model is an accurate representation of proposed structures and mechanisms the phenomena under investigation would be casually explained (ibid, p. 83). Approach to analysis according to Blaikie's (2007) logic was based on the shaping of ideas from evidence, and using evidence to form ideas – again aligning with critical realist ideology of progression and change in theory (Hartig, 2011). Consequently, the analytical process is embedded in the researcher's critical realist positioning, where understanding of this research was to attempt to explain the mechanisms of teachers' intelligence feedback. Empirical data were generated, through the lens of intelligence theories, which in turn could be contextualised to enable, modify or nullify the action of mechanisms (Blaikie, 2007, p. 87). Overall, the two phase analytical procedure of this Doctoral study, as related to the types of analysis (e.g., deductive, inductive and retroductive) was as follows:

1. *Answering Research Questions* - Deductive and inductive coding to answer research questions

2. *Generation of Hypothesised Model* - Additional data from inductive coding used to form theory. Applying abbreviated grounded theory approach and links to previous research; thus, a retroductive analysis.

Due to the nature of this Doctoral study, which is predominately qualitative based, and thus one of few studies of this kind, applying the approaches of deductive, inductive and retroductive types of analysis provided the opportunity to explore codes, which existed outside of the extant literature (Chapter 2). Furthermore, the two phase approach which encompassed three types of analysis, provided the opportunity to answer the research questions, whilst making links to theory and presenting unique insights into additional processes, which have not previously been explored.

3.15 Summary

To summarise, this Doctoral research used a combination of questionnaires, observations and interviews in order to yield data. Initially, these three methods were chosen in relation to the RQ's and research domain, however the nature of the rich data collected resulted in codes and emerging themes external to the RQ's. Given that data external to RQ's could not be ignored, as providing further insight into teacher's intelligence beliefs and intelligence feedback, a phase two analysis was undertaken in the form of abbreviated grounded theory. Following on from this section, Chapter 4 presents the data and findings of the research.

Chapter 4

Data Presentation

(Phase One Analysis)

Introduction

Chapter 4 presents readers with the data from all participants of this study. Data is presented in relation to the implemented methods, detailed in Chapter 3 (e.g., self-report questionnaires, recorded observations and semi-structured interviews). Furthermore, participant data is presented under codes used throughout the observational process (see Sections 3.10 and 3.11). Using codes to present data assisted with focusing on key areas of intelligence feedback, as presented in the literature. Data analysis is further discussed in relation to the research questions and findings in Chapter 5.

4.1 Questionnaires: Theory of Intelligence

Questionnaires were utilised in order to measure participant's self-reported belief of intelligence. Self-report results were later corroborated with observational and interview data for comparison of individuals' observational feedback and attributions for intelligence feedback and behaviour in interviews. Individual questionnaire data is presented under each participant heading (Sections 4.5 to 4.14) that follow later on in this chapter.

All questionnaire data is summarised in the table below to provide the reader with an overview of all questionnaire results (Table 4.1). While individual participant data is presented under each participant heading in Sections 4.5 – 4.14:z

Table 4.1. Questionnaire Data for all Participants

Teacher	*Age*	*Sex**	*Ethnicity*	*Time in teaching*	*Theory of Int***	*Previous engagement*	*School ****
Participant 1	26	F	British	2y	2 – INC	Y – INSET in School	1
Participant 2	27	F	British	1.5y	2 – INC	Y – INSET in School	1
Participant 3	32	F	British	10y	2.25 - MIXED	Y – INSET in School	1
Participant 4	29	F	British	7y	1.25 - INC	Y – INSET in School	2
Participant 5	35	F	British	11y	1 - INC	Y – Own research	2
Participant 6	33	F	British	10y	2 - INC	Y – INSET in School	2
Participant 7	32	M	British	4y	1.5 - INC	Y – INSET in School	3
Participant 8	24	F	British	5y	3.25 – MIXED	Y – INSET in School	4
Participant 9	34	F	British	9y	3.25 – MIXED	N	5
Participant 10	28	F	British	6y	3.25 - MIXED	Y- Own research	4
Mean	**30.2**	---	---	**6.6y**	**2.18 -MIXED**	---	---
Teacher	**Age**	**Sex**	**Ethnicity**	**Time**	**Mindset**	**Previous engagement**	**School**

(*F = Female, M = Male; **INC = Incremental Theory or Intelligence, MIXED = Mixed Theory of Intelligence; ***See Appendix 9 for school context)

Limitations of Sample

Across the sample, it was identified that there were no entity participants and all participants were under the age of 35. Other researchers have suggested that entity endorsing teacher participants are difficult to sample, given that most teachers are aware of "Growth Mindset" principles from Continued Professional Development and are, therefore, more likely to report incremental endorsement (Song, 2018; Yu & Kreijkes, 2017) (Section 4.1). Recommendations in relation to the sample limitations is provided in Section 7.3.

4.2 Video Recorded Observations

Using video recorded observations provided an opportunity for teachers to review and reflect on their lesson in the semi-structured interview (Section 4.3). Previous research has studied the role of various types of incremental versus entity behaviours (e.g., failure/error, challenge, praise etc.), therefore observational data were analysed in relation to the key areas identified within the literature and categorisation guide (see Sections 3.10 - 3.11). The observations and observational categories also underpinned interview questions and yielded data, which was used to explore key areas of intelligence feedback. The table (4.2) below presents frequencies of each observational code, across all ten teachers.

Table 4.2. Percentage of Feedback for all Participants in Observations

*Observational Code **	*Inc Feedback*	*Ent Feedback*	*Neu Feedback*	*TOTAL*
F/E	21	7	11	39
Fb-	0	1	14	15
Fb+	6	2	208	216
Fb	0	0	278	278
C	197	59	11	267
Sf	83	1	12	96
Cf	0	2	0	2
G	7	0	0	7
ML	0	0	622	622
Total	314	72	1156	

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

4.3 Semi-structured Interviews

Semi-structured interviews were informed by the codes from video recorded observation guide (Table 3.3. Observational Codes). Video recorded data was also used for stimulated recall in semi-structured interviews. Teachers were provided with segments of recordings to reflect upon and discuss attributions for their intelligence feedback (see Section 3.12 and 3.21.1).

Analysis, Coding and Themes

In order to code interview data, thematic analysis (Section 3.14.1) was chosen as a means to identify themes relating to research questions (Section 1.2) and apply a deductive coding framework using pre-conceived codes (e.g., observation guide). Notably, participant data were presented under the pre-determined codes of the observational guide in order to explore RQ's in relation to pre-existing literature – as identified in the observational guide. Additional themes which were not explored prior to data analysis (e.g., inductive themes) were also identified simultaneously when coding deductively, and added across the coding process (Sections 3.14.3). Inductive codes were useful in reporting all aspects of the data, and providing a broader understanding of teacher attributions for intelligence feedback – which was outside of previous literature. Furthermore, inductive codes were defined and added by the researcher to a larger index (see Appendix 12). The aim of defining codes was to provide transparency across the analytical process, as well as completeness and representativeness of data and analysis, an integral aspect of thematic analysis (see Section 3.14). Data and emerging themes which did not fit into answering the RQ's was useful for phase two analysis (see Chapter 6).

Individual interview data were analysed as collected. To begin analysis, following transcription, individual interviews were both inductively and deductively coded. For example, coding for deductive themes identified in relation to the coding guide (Sections 3.10 and 3.11), as well as new and emergent inductive themes. Inductive themes identified by participants in interviews were added as they arose, into Nvivo (v11) software. In light of any additional inductively derived codes, which were added across interviews, previous interviews were recoded for new inductive themes where necessary. For example, if an inductively derived code of 'confidence' was identified by P5, interviews with P1 – P4 were recorded in light of the newly added code and included further interview coding (e.g., across P6 – P10).

4.4 Approach to Analysis

The first interview analysis, from Participant 1, yielded 77 codes initially. Following the analysis of all interviews there were a total of 111 codes, including sub codes within larger codes (e.g. 'Hindrances to Role' which is a sub-coded with 'Behaviour, Class size, Time' and 'Limitations') (Figure 4.1). Note, appendix 12 presents all codes and themes. Sub-codes were useful in order to identify all aspects of teacher interviews and provide representation of each participant in data analysis. Sub-codes were also used to provide further insight into individual experiences of teachers in the sample, as well the identification of common attributions, experiences and beliefs amongst teachers.

Theme	*Sub-Code*
Domain of Intelligence	
	Academic
	Achievements
	Behaviour
	Creative
	Engagement in Tasks
	Intelligence Definition
	Knowledge
	Lacks common sense
	Language
	Like Skills
	Measurement
	Questioning
	School
	Social Skills
	Spectrum
	Student Perceptions
	Subject Specific
	Traits
Emotions	
	Negative
	Positive
Language about Students	
	Negative
	Positive
Learning Environment	
	Calm
	Collaborative

Theme	*Sub-Code*
Teacher Ecology	
	Collaboration
	Enjoyment in Role
Feedback	
	Challenge
	Class
	Critique
	Failure
	Individual
	Neutral
	Praise
	Earned
	Speed
	Written
Hindrances to Role	
	Behaviour
	Class Size
	Time
	Limitations
Teacher Impact	
Knowledge Development	
Context	
	Sets
	Situational
	Judgement
	Outcomes

Figure 4.1 A selection of interview themes and codes – Taken from Nvivo

10 of the 111 codes were identified as larger themes (Figure 4.2), such as "Teacher Ecology", 'Domain of intelligence' and 'Motivational Lang'. Reviewing codes, larger themes were

identified as encompassing other large codes. For example ''Teacher Beliefs' which included beliefs about intelligence and could be sub-divided and associated with "Knowledge Development". Thus, refocusing on salient broader themes from smaller codes, in accordance with Braun and Clarke's (2006) phases 3 – 5, of their six phase thematic analysis guide (as discussed in Section 3.14.1).

Theme Names
Domain of Intelligence
Emotions
Language about Students
Learning Environment
Motivational Language
Process (Conscious vs Unconscious)
Student Centred
Teacher Beliefs
Teacher Ecology
Theory of Intelligence

Figure 4.2 10 Themes

Sub categories included in pre-existing wider categories. For example, when teachers discussed beliefs about student failures this was coded under "teacher ecology/feedback/failure" and included in the 'teacher belief' theme. It was possible, however, to arrange data presentation using the nine observational categories and one additional heading (internal/external factors), for consistency across presentation and answering of RQs. See Sections 4.5 – 4.14 for individual teacher analysis and summary, followed by Chapter 5 for findings of the research.

Summary Statistics

This section presents a summary of individual participant data, including questionnaires (Section 3.8), video recorded observations (Section 3.9) and semi-structured interviews (Section 3.12), presented in order of data collected. Individual teacher summaries aim to provide the reader with an overview of data, which underpins overall findings in relation to the research questions (see Chapter 5). Furthermore, summaries can be linked to raw data presented as quotes throughout, in order to demonstrate transparency and rigor across the analytical process (as discussed in Section 3.13).

Frequencies of behaviours presented in data, such as specific types of intelligence feedback, were not used as a means of measurement directly, as some teachers were from differing schools and teaching across year groups and subjects (although all at Secondary School level). Frequencies were used, however, to present an overview of intelligence feedback in each individual lesson and contribute to interpretive data. Thus, data were analysed sequentially as collected, before concurrently, to answer research questions and formulate a hypothesised theory (Chapter 6). Frequencies of intelligence feedback type (e.g., incremental, entity or neutral feedback) also assisted with answering research questions; for example, congruence of stated belief and behaviour. The percentages of observational frequencies were used to provide an understanding of use of intelligence feedback and specific behaviours observed, as related to the observation guide.

Presentation of Data

To reiterate, the data presentation in the follow section for each teacher is sub-divided into the 9 original categories yielded from observational data and underpinned by literature (e.g., Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML). Interview data were coded for each teacher as identified through thematic analysis of each interview. Some data were coded multiple times, for example if teachers expressed their belief about their use of praise, data could be categorised in accordance with the statement made (e.g., codes may include “teacher belief”, “praise”, “incremental”, “student centered”). The purpose of using the 9 categories for data presentation was to provide a top down approach to the data analysis, in the first instance to answer RQs (Fereday & Muir-Cochrane, 2006; Willig, 2013). The 9 categories were therefore appropriate for data presentation with individual participants, given the pre-existing literature, methods of data collection and 3 research questions. An additional category was also included, identified as ‘internal/external’ factors’, in order to account for the teacher ecology model which underpinned the Doctoral thesis. This section would also assist with answer RQ3, regarding teacher beliefs affecting intelligence feedback. The interviewer across all participants was the researcher, referenced as ‘CR’ in direct quotes.

4.5 Participant One (P1)

4.5.1 Questionnaire Data

Participant one (P1) was a 26 year old, British female, having taught for 2 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 1, identified as a mixed-sex, academy located in a rural area (Appendix 9). According to the intelligence belief self-report she identified as an incremental theorist, scoring 2 overall. She had previous engagement with mindset training through INSET in school.

4.5.2 Observational Data

The class observed was a low ability year 9 English class, in accordance with school setting (e.g., low, middle and high ability). Observational data from P1 indicated that intelligence feedback was neutral, entity and incremental. Comparing dichotomously, entity feedback within P1 practice was displayed 17.4% and incremental feedback at 5.8%. Neutral intelligence feedback was observed most frequently, at 76.5% in total. Observational data suggests partial alignment with a self-reported belief of an incremental theory (score of 2), however some instances of non-alignment (e.g., consistent alignment of incremental belief-incremental intelligence feedback).

Table 4.3 P1 Observation: Theory of Intelligence Feedback Frequencies

P1	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***5.8%***	***17.4%***	***76.8%***	***100%***
Frequency	***4***	***12***	***53***	***69***

When exploring intelligence feedback, as underpinned by the observation guide (see Section 3.9), data indicated P1 used motivational language more frequently (55.8%) than other types of intelligence feedback. Intelligence feedback surrounding failure/error, feedback (general) and references to goal types were not present in this observation, although discussed and identified in interview data.

Table 4.4 P1 Observation: Categorised Feedback Frequencies & Percentage

P1	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	0%	3.4%	3.4%	21.6 %	13.6 %	1.1%	1.1%	0%	55.8 %	100
Frequency	0	3	3	19	12	1	1	0	49	88

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

The table (4.5) below presents the percentage of theory of intelligence feedback, in relation to the individual codes within the framework. For example, P1's use of challenge related feedback consisted of 8.3% entity, 83.4% incremental and 8.3% neutral.

Table 4.5 P1 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	0	0	0
Fb-	0	0	0
Fb+	50	50	0
Fb	0	0	100
C	8.3	83.4	8.3
Sf	0	0	100
Cf	0	100	0
G	0	0	0
ML	0	0	100

4.5.3 Interview Data

In the interview with P1, a total of 216 elements of raw data (e.g., a quotation) were coded. Of the 216 in total, these accounted for 61 different codes, indicating some codes were referenced multiple times across the interview. Across interview data, P1 reflected on various points of the lesson. P1's reflections were related to the 9 codes used in the observation guide, as well as additional codes (discussed in Chapter 5). New codes were defined as those outside the scope of research question focus, however they were linked to the teacher practice and attributions for behaviour. Where data were not present in interviews (e.g., if participants did not talk about goal structures), general comments were made in relation to the observation, if applicable.

Failure/Error

Within the interview P1 discussed beliefs about failure for the students working in the class recorded. She noted that the class experienced a lot of failures, predominately as they were a low ability set. P1 believed that there were different types of failures, for example, failure or error could be attributed to students' positive or negative instances of effort. Negative instances of effort were identified as students' misbehaving and failing, in opposition to students making a positive effort through persistence when failing. As well as this, P1 identified that failure was needed in order for students' to improve. The interview extract below highlights failure, as discussed in P1's interview:

> *CR: So I suppose...thinking about this particular class. Do they experience quite a lot of failures?*
>
> *P1: Yeah*
>
> *CR: So, erm...to them, and to you, is that kind of a big thing - in terms of their failure. Like if they're failing...*
>
> *P1: They think it is...I don't. Unless they are just being irritatingly stupid. Not in the fact that they're struggling. It's when they're coming out with daft questions. I've physically told them what to do, I've given an example, I've gone through it on the board. You know, things like that?*
>
> *CR: So, you've like given them strategies to get them thinking about it?*
>
> *P1: Yeah, so when they decide that they want to hit each other with a ruler instead of listening to me then I get frustrated with them. And when they fail that's when I'm annoyed because they've been too busy faffing about. That does my head in... erm...but no because they need to. Do you know what I mean?*
>
> *CR: Yeah.*
>
> *P1: They need to fail because that's what they have to do to get better. Well everyone does anyway. Do you get me?*
>
> *CR: Yeah, does that…*
>
> *P1: It doesn't affect me because I don't get annoyed with them in that way ...but like. I always say them…they say to me, 'miss I've done it wrong' and I say to them 'but have you tried?'. That's what I always say to them. 'have you tried?" because if they have you can work from that.*

Within the extract, P1 identifies that failure or error does not cause frustration for herself, however students' behaviour and a lack of effort does. Consequently, when students fail or make errors because of behaviour, this evokes a negative response in P1.

It is also important to note, that P1 expressed that they believed they made an effort to assist students in their understanding of tasks (e.g., use of board and examples), therefore assisting pupils through strategies. According to P1, failures following P1's strategic assistance are "annoying", as they are a result of students "faffing" (e.g., ineffective use of time) or being "stupid" (e.g., inappropriate behaviour, rather than a lack of intelligence).

In the recorded lesson, when students failed, P1 asked students to redo work or correct it, and in some instances pupils were given feedback in order to assist development of work (e.g., incremental feedback). At other points, students were told to "chill out" or ignored, with little feedback provided (e.g., entity feedback). P1 suggested her response in the latter cases was as a result of feeling frustrated with pupils and the lesson being at the end of a "busy term". Therefore, attributing her feedback to both an external factor, workload, and internal factor, emotion. P1 responses to failure and error were therefore both entity and incremental.

Criticism Feedback

When discussing criticism feedback, for example critiquing student work and asking students to do work again, P1 discussed beliefs about a student being lazy. In the extract below, P1 was reflecting on an instance where she had criticised a students' work, stating it was not very neat and she needed to improve. The instance P1 reflected on was when a student did not include key points on the assigned task and they were asked to complete the task again.

> *CR: Do you think that…, what does that say to her?*
>
> *P1: That's not good enough.*
>
> *CR: Do you think it implies anything in terms of her intelligence?*
>
> *P1: Ooo... probably both [intelligent and not intelligent], because she's, at the moment, on a report and stuff like that...*
>
> *CR: Yeah I remember you saying at one point 'do you want 2 no's on your report'*
>
> *P1: Well it's because of the amount of work she does and things like that, so I'm guessing…she's probably getting sick of people being on at her all the*

time. Like right go and do it again. Do this, you need to get this right. So maybe… hmm…it is questioning her intelligence. I don't know… she is just lazy. She's very lazy.

Within this instance P1 believed that the student was lazy, and this is why they did not include the points requested as part of the task. P1's belief about the student being lazy was reinforced by the student being on report - a school monitoring system across all lessons for pupils who are underachieving in relation to progress, behaviour or effort. P1, however, noted that frequently asking the student to redo work may affect the students' belief about their own intelligence. Furthermore, P1 stated that the student being on report would contribute to them feeling unintelligent, as P1 believed the student would view being on report as insinuating a lack of intelligence. According to P1, the student was on report for lack of effort and low work output, which they identified could socialise lower intelligence and consequently diminish the students' work output even further. Therefore, a combination of factors appeared to affect P1's intelligence feedback towards this student. Across the lesson, P1 did, however, make some attempts to scaffold tasks for this pupil, although they were also frequently told to concentrate or ignored when requesting assistance.

Praise Feedback

Discussing praise with P1, she believed her use of praise was frequent within the classroom. Stating typical praise phrases as ''oh yeah, that's really good!" and "oh, well done lad!" The examples provided by P1 highlighted a neutral theory of intelligence within their praise, although valenced positively – suggesting positive intelligence feedback for students. Despite P1 providing examples of the types of praise she used, she praised students twice across the lesson, as discussed:

CR: Would you be surprised if I said that in this lesson you praised them twice?

P1: Do I?!

CR: Across the whole lesson.

P1: Yeah... Mmmm… But you've got more opportunity in a proper lesson. So like…

CR: Yeah, that's the thing. I was just interested, to again, to talk about it, within this lesson… which maybe isn't like a normal lesson?

P1: Yeah, because in a normal lesson you have your hands up bits… I probably could have praised them a lot more... Laughs

The extract highlights that the P1 was surprised, however they believed that their lack of praise in this instance was because it was, again, the end of term and the lesson was more informal than usual. Later in the interview she reflected on her entire teaching approach within the observation and stated:

> *P1: I just act like I can't be arsed in that… all the way through… I look like I can't be arsed. You can tell it's the last week! Proper bad.*

The feedback and behaviour of P1 for use of praise, and general attitude, were therefore attributed to the time of year and type of lesson observed.

General Feedback

General feedback was provided on various occasions to students, where P1 read work and said "okay" or a student asked P1 a question to state their understanding, again answered by "yes" or "okay". In addition to observational general feedback, students' work was frequently acknowledged by P1, although again, the feedback provided was neither positive nor negative. In these instances feedback were therefore both disassociated with a theory of intelligence and were also not valenced. P1 did, however, identify that they believed there were differences across their feedback to students:

> *CR: Awhh, yeah! Cool, the last one is… Do you think there are differences in the types of feedback that you actually send to kids?*
>
> *P3: Yeah.*
>
> *CR: Okay. Go on…*
>
> *P3: Yeah definitely. So especially from seeing that. So you can see that I'm getting annoyed at her at different points because she's just being Megan. Do you know what I mean, like… erm… And then me going 'oh fancy' Is me being daft and I'm showing more of a humorous daft side, I'm guessing.*

This reflection was related to general feedback, as not associated with a theory of intelligence, although valanced as either positive (e.g., use of humour) or negative (e.g., being annoyed at a student).

Challenge

When discussing the use of challenge in the classroom, data from video observations suggested P1's approach to challenge was predominately aligned with entity theorist behaviour. 83.4% of all challenge intelligence feedback was categorised as entity. Examples of entity intelligence feedback in the lesson were noted when P1 gave students answers to questions or did not provide additional challenge, when students' had completed work. Discussing attributions for entity behaviours with P1, however, she attributed behaviour to her beliefs about the students' effort, as in the following extract:

> *CR: When I was looking at it I was thinking about it and this idea of challenge, erm and at about 22.4..erm..Yeah at 22.4 you kind of ask her about something and then it's like 5 seconds later and you tell her the answer?...I' m like interested to kind of…erm...to understand the processes that happen with all this. Because I've done it before, but I just kind of wanted to understand your thinking about it.*
>
> *P1: Yeah*
>
> *CR: Like why you do something, especially with her…that kind of thing. So, what would you say with her..erm..*
>
> *P1: Was it Megan (1)?*
>
> *CR: Yeah it was Megan (1)*
>
> *P1: Probably because she was doing my head in…probably, I'll be honest..She would have kept asking me a stupid question which she knows the answer to, but.. But she puts on this, and I shouldn't say it you know, but this thick act. So she acts a bit dumb. And knows the answer. Now, if she is struggling then it's a different story. But that was probably the most easiest lesson. And she's asking daft questions... She's wasting my time*

According to P1, the student in this instance was aware of the answer, however P1 felt as though it was all an act – and therefore was "wasting" P1's time. When discussing instances of not providing additional work, P1 suggested that when students finish, additional work was "unfair, unless they need it". However, P1 did not elaborate on what constituted as needing additional work.

> *P1: George tends to be the one who finished first. So will go around and, say for example Megan (2) who struggles or Martha*
>
> *CR: Yeah*
>
> *P1: He will go and help them. And then it tends to fill out the lesson, because I don't see the point in giving them more work. Because it's not fair… unless they need it. But they can go through their books and sort out their books because there's always papers everywhere with them.*

In the above extract, it was also suggested that students organising their books was a more productive use of time, following task completion, rather than providing additional work (e.g., associated with entity practices). There was, however, an instance where P1 provided the option of challenge to the class (in the observation) stating students could choose to trace or use freehand in a drawing task – depending on how much they wanted to challenge themselves. Incremental feedback of challenge, however, only accounted for 8.3% of all challenge related intelligence feedback in the observation.

Strategy Feedback

A frequent strategy P1 used across the lesson was asking other pupils to assist with students who were struggling. For example, Megan needed assistance and P1 asked Tim to help her. When discussing the use of other students to assist one another in the interview, P1 stated this was a good strategy as she felt students could explain concepts to each other in new ways:

> *P1: He can talk to the kids on their level, they understand it better, than it coming from me. Sometimes, sometimes anyway. And like, just looking through their work checking their spellings or putting letters in the right place. Pretty much that.*

Additional strategies for assisting pupils were also discussed in the interview, although not present in the observation. This was linked to P1's perception of failures. For example:

> *CR: But if there's a point where a student is working on a task okay and they say 'right miss can I have some help' and you go over and give them some kind of support and then they're still not getting it…erm…how do you respond to that?*
>
> *P1: Hmm...It depends on the task doesn't it… erm... in that situation I gave her some ideas about what to write on the letter which was on the board as well. So I'd probably just like reiterate them to them. Erm… but... what's the question again?*
>
> *CR: So, if they're repeatedly getting the question wrong. Say for example, they're doing spellings and they kept getting them wrong?*
>
> *P1: If it's spelling it's going to be practice. Breaking it down. Erm...In general, if I've got a TA in the room I'll get the TA to sit with them...either... Me sitting down with them, and just saying wait a second, let everybody get on task, I'll sit with you and go over it and more scaffolded... erm. Asking someone who I can trust in the room, for example George or Lee if it was in this situation... In this lesson… It'd be look on the board.*

P1 noted that strategies would be dependent on the task, however it was identified that P1 could draw upon a selection of different strategies in order to assist students learning. These were also related to instances in the observations, for example the use of other students. From the interview, it was noted that P1 could reflect on various strategies they would use to develop students' knowledge and assist across failures.

Comfort Feedback

In the observation there was one use of comfort feedback (28:36). A student was frustrated in a drawing task, and repeatedly said "I can't draw" accompanied by slamming their pencil down, indicating the work was challenging. P1 responded by telling the student to "chill out", however failed to provide any support or direction within the task. The comfort in this scenario was therefore implied in attempting to emotionally calm the student, although there was no follow up to assist. Consequently, this instance highlighted P1's socialisation of entity feedback of challenge, due to little scaffolding or support, and a lack of encouragement across the task. Although, it is noted, comfort feedback was not explored in the interview.

Motivational language

When discussing the use of motivational language across the lesson, P1 identified that she motivated students through emphasising effort and individual learning at home, irrespective of getting the answer correct, stating:

> *P1: So, with the PEAS they really struggle with that. And I'm like, as long as you go home and do one, I don't mind if it's wrong... But you've given it a go. Because you can find some way, of like, structuring it better.*

P1 did not elaborate on her general use of motivational language (such as "shh", "right", "listen" etc.)

Goal Structure

P1 informed students of their objective at the beginning of the lesson, which was a continuation of the previous lesson - to create a letter reflecting the traumas of the war. The teacher described this lesson, in the interview, as "relaxed" as the lesson was at the end of the term. Pupils were given the task of copying letters previously drafted and encouraged to present their "best work" in their "best handwriting" and that the outcome should be "perfect". The use of language here, "best" and "perfect", therefore suggested that the final outcome could not contain errors or mistakes. The entity framing words potentially socialised an entity theory, given that any work less than perfect or containing mistakes would not be acceptable.

Overall, the task was not presented as a competition of competence in relation to peers (e.g., performance goals), and rather, the students were left to decide how best to present their work. Strategies were suggested to students in order to guide students (e.g., drawing lines for writing straight across the pages or writing freehand without lines). As the task emphasised individual effort and open ended outcomes (e.g., individual letters), the lesson was task focused. Progress and achievement in this case was based on the task, as opposed to competence and/or unrelated to future achievement. Goal structure was not touched upon in the interview.

Internal and External Factors

Across the interview, P1 expressed that there were external and internal factors which affected her practice. Notably, students' social backgrounds (an external factor) were referred to on numerous occasions – suggesting that individual students are a consideration in relation to expectations and feedback. For example:

> *P1: Because you've got the likes of him (points to a student on class list), who's very clever, but obviously her EAL - she's going to be behind.*

P1 believed that one of her students with English as a second language would end up behind, inferring P1 held preconceptions about the student – although not because she lacked intelligence, it was her language that was a barrier. In addition to this, P1 directly referenced her beliefs about students from the same family, stating two students behaved in a similar fashion:

> *P1: I look at them (points to two brothers) they act the same, they shout out, they ask stupid questions, they're looking for attention. I think that more or a social or home issue.*

Again, it was students' background which appeared to affect her practice, as P1 also referred to her approach with the class as "mumsey" – based on students' additional needs and lower grades. Between the above direct statements and the identification of taking a mothering role indicated that the external factors of social backgrounds and internal pressures of grades and expectations may have guided P1's interactions and, ultimately, her feedback to students.

Further, P1 self-identified that her mood (internal factor) affected her interactions and feedback with students. P1 reflected on her practice and identified:

> *P1: I'm in an can't be bothered mood, probably (laughs) probably! Because normally I'd be like, right wait outside and line up and let them come in again...but was I trying to send an email or something? I don't know if I've had an issue what I've had to try and deal with but it's just...taken my time...*

Here, P1 noted that there may have been a previous issue she had to deal with, which resulted in her teaching practice being different to her 'normal' approach.

4.5.4 Summary

There were a number of key points identified across P1's observation and the interview. Across her observed practice P1 displayed contrasting intelligence feedback. Feedback was both incremental and entity across instruction, as associated with both incremental and entity theories of intelligence, in accordance with the identified categories used for analysis presentation (e.g., failure/error, criticism feedback, praise feedback etc.). For example, an incremental feedback was noted when P1 attributed students success to hard work (process-praise). In opposition, P1 failed to challenge students on numerous occasions. P1 made various attributions for her lack of challenge, notably identifying that it was her knowledge of the individual student which dictated her feedback in practice.

Data from P1's self-report, observation and interview, therefore indicated that her intelligence beliefs and intelligence feedback did not always align. Despite her prominent use of incremental language in the interview and belief of a nurturing approach, P1 displayed little incremental feedback in practice, with incremental feedback accounting for 5.7% of all intelligence feedback in the observation.

4.6 Participant Two (P2)

4.6.1 Questionnaire Data

Participant two (P2) was a 27 year old, British female, having taught for 1.5 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 1, identified as a mixed-sex, rural academy (Appendix 9). According to the intelligence belief self-report she identified as an incremental theorist, scoring 2 overall. She had previous engagement with mindset training through INSET in school.

4.6.2 Observational Data

The class observed was a mixed ability year 8 Art class. Across observational data, P2's feedback was predominately neutral, at 90%. Neutral feedback in P2's observation was most frequent in their use of motivational language, accounting for 82.9% of all intelligence feedback. Neutral feedback examples in P2's observation included instructing students to "shh", indicating silence and more concentration when students were working (as discussed in the interview), as well as responding to low-level behavioural issues (e.g., "girls can we be sensible"). Despite P2's incremental endorsement, intelligence feedback across all coded events in the observation were both incremental (7.3%) and entity (2.7%); although more frequent use of incremental language comparatively. Results from the observation therefore indicated that P2 did not always enact in accordance with her incremental self-reported belief.

Table 4.6 P2 Observation: Theory of Intelligence Feedback Frequencies

P2	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***7.3%***	***2.7%***	***90.0%***	***100%***
Frequency	***8***	***3***	***100***	***111***

P2 used challenge 6.3% across the lesson, with this being the second highest frequency of intelligence feedback to students. 85.7% of P2's challenge feedback was incremental, while 14.3% were entity. Compared to all entity feedback, challenge feedback was where P2 used the most entity intelligence feedback. Notably entity challenge feedback was most visible when P2 gave students the answers, or did not challenge students who had finished work. However, overall, use of challenge intelligence feedback was predominately incremental.

Table 4.7 P2 Observation: Catagorised Feedback Percentages

P2	*F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	1.8%	1.8%	2.7%	1.8%	6.3%	1.8%	0%	0.9%	82.9%	100%
Frequency	2	1	3	2	7	2	0	1	93	111

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

Furthermore, there were low uses of intelligence feedback relating to feedback praise (2.7%), failure/error (1.8%), strategy feedback (1.8%), neutral feedback (1.8%), feedback criticism (1.8%) and goal structure (0.9%). Comfort feedback was not observed at any point across the lesson. The table (4.8) below presents the percentages of P2's use of incremental, entity and neutral feedback within each category:

Table 4.8 P2 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	50	50	0
Fb-	0	50	50
Fb+	100	0	0
Fb	0	0	100
C	85.7	14.3	0
Sf	50	50	0
Cf	0	0	0
G	100	0	0
ML	0	0	100

4.6.3 Interview Data

In P2's interview, 74 codes were referenced, while a combined total of 240 data items where coded, with some data items coded multiple times. Data were coded using the Nvivo software. New codes were added, where necessary, when coding interview data. Data which had not been coded in light of new codes were recoded (e.g., P1 interview data).

Failure/Error

In the interview, P2 viewed an instance where a student within her lesson was incorrectly completing a task, making an error. In order to further understand P2's behaviour, a section of the observation was played back to instigate stimulated recall. During the discussion of the section reviewed, P2 use language commonly associated with an incremental theory, which reflected her self-reported theory. The section below is taken from the interview:

CR: So, at that point is he… has he failed at the task and you're telling him to be consistent? And like… but trying to do it in a…

P2: More than likely. In a not so, you are failing 'slap' way (laughs) more of a 'let's revisit that one...'

CR: So, in that sense, what do you think that tells them about their intelligence? Saying, right you've got to be consistent?

P2: It's that they're not stupid…and they know how to do it. It's just they're not doing what they know they already should be doing.

This section of data suggested that P2 believed in the importance of revisiting work, and guiding students when failing (e.g., incremental feedback), in opposition to reprimanding students when failing. P2 then furthered her comment, stating that her students are aware they are not stupid for failing. Rather students know what they should be doing, they are simply completing a task incorrectly. P2 expanded on her beliefs about responses to failures, stating:

P2: I think it's… if somebody said erm, if somebodies quite mean to me and says I do something that's 'not right' it makes me feel as though… physically sick. And I've never want a kid to feel like I'm being that person to them. Because then they don't want to learn. I wouldn't want to. I'd be like, well no thanks, I'm alright. I'll go and hide under a rock a die (laughs).

Within this section of the interview P2 reflected on her own experience of learning, identifying how previous experience as a learner influenced her own teaching. What was important to P2 was to ensure students felt as though they could learn, and be guided in a way which facilitated learning, despite any failures or errors. Consequently, P2's attributions for failure/error in the interview were, on the whole, reflective of incremental language (e.g., allowing students to revisit work and providing a mastery learning environment). When comparing the interview data to observational data, there were only two instances of responses to failure/error – one of these was incremental, while the other was entity. However, from the interview data, the ethos and language of P2 was more bias towards an incremental theorist.

Criticism Feedback

In the observation, there were two instances of criticism feedback. One of these was identified when P2 noticed a pupil had not completed a tidying task as requested, stating "Erin, that's not very neat, is it?" This comment was related to a request, rather than work directly and were therefore not discussed in the interview. The other instance was when a student was not focused on task, and P2 called the unfocused student an "idiot" – this was the instance of criticism feedback discussed in the interview:

CR: So, that bit there, I don't know if you heard, but you say 'Jake stop being an idiot'

AL: Oh no, do I?! (laughs) It slips out!

CR: So, things like that, do you think that it actually suggests anything to him in terms of his intelligence. Like thinking about Jake as an individual… Do you actually think to him…?

AL: No, he knows he's not an idiot. He definitely knows he's not an idiot. Erm, he's a managed transfer… oh god. That's so bad because I know I tell the kids to shut up all of the time.

When reflecting on this section of the observation, P2 stated they were not aware that they had made this comment to the student – it was only upon reflection, using stimulated recall that, their use of criticism feedback was apparent. When reflecting, however, P2 felt as though the student was aware they were not an idiot. Notably because P2 believed the student could sense she was being humorous. When continuing with reflection, P2 attributed her own behaviour to personal relationships with the student and that teacher-student relationships were an integral part of how she interacted with the student. On the whole, P2 believed students knew when she was being serious, because of her relationship with them and the type of learning environment she established:

P2: Because in theory, you're not supposed to say anything derogatory to the kids. That's going to imply something about their intelligence, or, you're not supposed to call them idiots… but he was being an idiots (laughs)

CR: Again, though, this… I touch upon this again at a different point, but you seem to have quite a good general rapport with the kids anyway though.

P2: That's because I'm down with the kids (laughs)

CR: but how important is that?

P2: For me, it depends on your teaching style, because personally I have to have a good rapport with them because if I'm not enjoying my job, I won't stay. Whereas [another teacher in the department] will shout and shout, and the kids will work in absolute silence and they'll be afraid, I prefer the dynamic of there's constant collaboration between us and there stuff going back and forth and we're constantly having fun. And I can see they're enjoying it and because they're enjoying it they're taking things in. Whether it's subliminal or whether I'm cramming it down their throat, I can tell that they are taking something from it. And they'll remember things because there'll be a little joke it, because that's how I learnt. I don't remember rhymes of anything, but if I remember there was like a jumping pink frog and that related to pi then that's my connection. I don't know, maybe that's just the way I teach… he is an idiot though. (laughs) He is! He has a doodle book though that's like a

> *behaviour management tool, so I think he went out and got his book at one point, but then he was hitting someone with it! So….*

The above extract indicated that, according to P2, students' are aware of different types of language used, dependant on the context. Therefore, if a student is misbehaving, as was the case in the extract above, the use of "stupid" was not a reflection of their intelligence, and more so their behaviour – irrespective of implications from the use of language. Furthermore, P2 suggested that the environment of her classroom, in comparison to another teacher in the department, was more enjoyable – due to the dynamic of collaboration and having fun and enjoyable. Therefore, it was possible to use criticism language in her teaching, when appropriately judged, as she believed her teaching style was to build relationships with students and create a positive learning environment. Again, this attribution was related to her own experience of being a learner, which was frequently referred to across the interview. Comparing P2's use of criticism between interviews and observations indicated P2 used entity feedback within the classroom because she believed that some language is not always suggestive of an individual's intelligence, dependant on teacher-student relationships.

Praise Feedback

Focusing on praise across P2's data, there were three instances noted in the observation, however all of these were neutral by nature. For example "good" and "excellent", therefore positively valanced as praise but disassociated with theory of intelligence. Despite there being no instances of incrementally focused praised (e.g., process – "excellent, you've worked hard on that") P2 emphasised various key points in relation to her use of praise. The extract below highlights some of these:

> *P2: Erm… I think you can't be too… I think whenever I give praise I try and give eye contact, because I want them to know that I am focusing and I am praising them for something specific, and you do matter and what you're doing it good. Erm… And then. I don't give out sweets anymore, but that used to be full. So… But erm… praise is really important, to be fair. Even for the tiny little things. Like again you don't know what they're facing at home. And what if they're doing the best stuff at home and they get a slap from the parent. So, you know it's like a well you're doing alright, well done, kind of thing. So… what was the question, did I answer?*
>
> *CR: Erm do…yeah, no you did. So, I was saying different types of praise and does it matter. But you kind of yeah.*

P2: Yeah it does. Yeah. Even if it's just a tiny flippant, you're making good progress… or you're getting on with the task, well done, that's alright that. Or…

Within the above example P2 noted eye contact, focusing on the individual and use of specific praise as important features of praise feedback. As well as praise for "tiny little things", particularly in light of student's social backgrounds. From this extract, it was noted that P2 appeared to be concerned, again, about the type of learning environment she created and ensuring students felt valued in her classroom – notably through praise. P2 also referenced instances where rewards were used, in the form of sweets, although this comment was not elaborated on – it was suggestive that students received sweets as a form or reward, and potentially, praise.

When probing further, following the above extract, P2 revealed more about her use of praise, notably that it had to be "meaningful" to students:

CR: When you said flippant, there. What did you mean by flippant?

P2: So, some people just say 'oh yeah it's good'

CR: Right, okay, so it's like…Earned.

P2: Yeah, it's got to look like its good and… you can just say it to like get rid of a child.

CR: So, it's always meaningful? Meaningful praise?

AL: Yeah, and not just like…flippant. Bye!

Again, P2 emphasised the need for students to earn praise, and for praise to genuine from a teacher. Overall, the terms used by P2 were suggestive of creating a positive learning environment, despite there being no use of incremental praise and only 3 instances of feedback praise.

General Feedback

Within the observation there were two instances of general feedback – these included P2 nodding after looking over a students work, and telling a student 'okay', again after looking over what the student had done. General feedback was not discussed directly with P2 in the observation, as P2 referenced more instances of positive uses of praise.

Challenge

When exploring challenge, there were many references made throughout the interview, and seven in total across the observation. Of the seven instances in the observation, six were incrementally based. The one entity instance was when P2 stated, when teaching, a lot of the class would not progress to the extension task, therefore insinuating students lacked the ability to progress to the extension - which could have potentially demotivated students to work towards the extension task. For example, if students perceived P2 as having low expectations for reaching the extension task, they may be less likely to work as hard. However, it was important to note that in the interview P2 identified that external pressures (e.g., topics in a scheme of work) were ensuring students start new topics at the same time. New topics required direction from P2, which was not possible if some class members had not finished.

> *P2: Erm. Because I don't want to move them onto the next topic or different things because that have to go onto a PowerPoint where they get information. So, they have to sit and I can't move them onto watercolours, until they're all at the same spot. Most, half of the class, are finished but because of the size of the classroom, only two tables can be used for printing so it's like… because the class sizes keep getting bigger and I can't do it any other way.*

Despite the entity instance of challenge feedback, there were some clear examples of incremental challenge feedback in the observation and the interview. For example, in the interview P2 suggested that "there is always room for improvement" and even if a student thinks they have finished, more can be done in order to improve work. This was a particularly strong belief P2 held surrounding art, which was her main subject. In addition, when reflecting on a section from the observation, P2 noted:

> *AL: So, because I know she's good, and here colouring is good, she just needed to go back and do that bit… I think she's already stuck pieces on. Hasn't she?*
>
> *CR: Yeah… so what does erm, what does that maybe suggests to her in terms of her intelligence?*
>
> *AL: That you never finished. And you're never ever going to be done with it, like the thing is with are it just goes on and on and on!*

Overall, P2 expressed her beliefs of continuous improvement and refinement of work on many occasions, as highlighted across other codes in the interview (e.g. strategy feedback and failure/error).

Strategy Feedback

Within the interview P2 identified various instances of her use of strategies, with examples being incremental by nature. Examples included instances where P2 would scaffold work, whilst emphasising that practice is key in order to improve.

> *P2: I can't give them too negative stuff because I feel bad if I'm like that is awful and you can't do art and you should give up. I hate that. Erm… because my whole philosophy is that everyone can paint, everyone can draw, and everyone can do it if they just practice.*
>
> *CR: Yeah*
>
> *P2: so usually I just do positive reinforcement, you know. You've done a really good job, all you need to do now is this, this and this. Or if it's like someone's eye ill rub it out, or if it's the portrait ill rub it out and quickly sketch it and go there you go, right you have to finish that.*

P2 furthered her comments and gave an example of a student (Chantelle) who did not always put in effort, because she was unsure how to make the appropriate steps to progress. In such instances the work was too challenging for the students (e.g., Chantelle), which caused them to be unmotivated and not work. In response, P2 described strategies she used in order to assist with students' development of work:

> *P2: If I don't help her with some things she will just sit there. So, like I've taken her sketchbook home and I've put post-it notes in it. And sometimes I'll enhance a little bit of her drawing and I'll go "this is what I'm looking for..." or I'll put the photos in a certain, specific way and say "this is how you do composition of, like, your page, now everything has to look like this".*

Within the observation P2's incremental approach to strategy feedback was also apparent. In one instance P2 identified that a student needed to add more colour, and so suggested the student use some colours to make an image pop-out more. Although P2 instructed the student what to do (e.g., add more colour), the student was given the opportunity to use P2's strategy feedback in order to improve work, where they were responsible for choosing a selection of options (e.g., appropriate colours and which sections to colour).

Comfort Feedback

There were no uses of comfort feedback within P2's lesson and P2 did not suggest they use comfort language within their interview. Rather, their beliefs surrounding students who experience setbacks was to encourage persistence, as associated with an incremental theory of intelligence. For example:

> *P2: I think that everybody can draw. I think that everybody can paint, they just have to practice. Consistently. Always doing it. If you want it, you'll keep at it. Just like I could probably learn coding if I really wanted to…but I'd have to go and practice!*

Motivational language

Motivational language was used most frequently across the observation at 82.9% of all intelligence feedback. This language was neutral, therefore disassociated with a theory of intelligence. Motivational language by P2 was used in order to ensure students remained on task, and as reminders (e.g., "shhh", "get on with it"). Discussing motivational language in the interview, P2 commented on motivation feedback. P2 identified some of her motivations are valanced, for example using fear as a motivator for learning:

> *CR: So, what would you do then to motivate students to work? If those are the reminders what would be your, kind of motivators?*
>
> *P2: Oh god, I don't know… Do it or you get detention! (Laughs)*
>
> *CR: So fear motivation?*
>
> *P2: yeah, fear motivators for sure!*

While P2 also noted her motivational language was used to avoid shouting, as she believed if she was "screaming at them, they couldn't do half of what they were doing". Overall, motivational language was a key feature within the observation, although not discussed at length in the interview.

Goal Structure

P2 referred to continuing work the following week, thus emphasising progress over time across the task set. However, P2 made no other reference to goals within the observation, but did comment on the use of competition within the class. For example:

> *P2: So I say this group is this far ahead and this group is this far behind, and you're winning and to be fair we're always beating Mr. F and they'll be like "yeah, come on!" (laughs)*

The above quotation implies promotion of performance goals of the class as a whole, although does not directly reference individuals. Thus, comments such as the one above to students may socialise to students that they need to "win" in order to achieve. Consequently, comments of this nature may socialise an entity theory. However, furthering this P2 stated that they used competition as a class as motivator for learning:

> *P2: … if you're like we're behind, that does, you seem them like "oh, I can't be doing with that" that's not right. And if they see if I'm getting stressed they're even more like "oh, must do it!". So, definitely a motivator to compete with other classes. And we win.*

P2 citied class that the implementation of performance goals resulted in students being motivated to win. This is not to say, however, that P2 used competition in teaching with individuals, notably as there were no instances of performance goals within the observation.

Internal and External Factors

An external factor which P2 noted as affecting the classroom was the gender of students. P2 had preconceptions about students, based on gender, noting:

> *P2: Yeah, definitely. They're more chatty if they're girls. If they're boys though… they can get a bit extra rowdy, if that makes sense? So, like… yeah. I remember this… Yeah, we've also got a gender confused child in there too. Which adds to the class dynamic quite a lot.*

Another external factor P2 identified as affecting her beliefs, and potentially feedback to students, was the effort and autonomy of students. In the example below, P2 noted a student with English as a second language as 'intelligent' and she had 'a lot of respect' for the student, due to her 'knowing what she was doing':

> *P2: She's polish. I think the sunshine's out of her backside, she's the most brilliant photography student… She listens, she's not very good at English, she's really terrible, across the board, most other classes absolutely despite her, but that's included in food tech. whereas I think she's a very bright girl. Yeah, she is old, she's a year older, she was kept back… but, she's fantastic at art and she knows what she's doing and she'll get on with it. And I have a lot of respect for that, I think she is very intelligent, as such.*

Within the above example, the students English language ability was not an issue. Rather, P2 was more concerned with the student's work ethic, and ultimately this affected P2's intelligence feedback. Further reflection on students by P2 identified that the external life of students could not be controlled, however affected students and the impact of teachers on students:

> *P2: I think school is the tiniest little part to the kids. I really do. So, I don't… we don't have as much impact as people like to say, yeah we do see them a lot. But we don't control everything else that they see.*

An internal factor which affect P2's feedback was her belief about shouting, which affected classroom environment and interactions with students, as identified in the extract below:

> *P2: I don't like it. I don't like being shouted at, so why would they like to be shouted at?*

Another external factor also identified as affecting P2's practice, was schemes of work which were created by other staff. P2 indicated she did not like one of the tasks she was required to teach. However, the task was useful for keeping students 'seated', once they had finished the main task:

> *P2: It is. It's not much fun, so be fair, but it'll keep them seated and away from that lot, whilst that lot's going on. So… its Andy's task to be fair, it's not even mine. But they're doing it!*

4.6.4 Summary

Overall, in the interview, P2 expressed strong incremental views, believing students and individuals can achieve through practice and perseverance. Incremental based language (e.g., it just takes practice) was repeated on numerous occasions across the interview, and noted on some occasions in the observation (7.3% of all intelligence feedback). There were, however, instances where P2 inferred a lack of ability, using terms such as "idiot" and "stupid", socialising an entity theory to person feedback (e.g., innate intelligence) (2.7% of all intelligence feedback). P2's reflection and subsequent attributions in the interview revealed that she deemed her entity based intelligence feedback appropriate and it would not affect students. P2 believed her relationship with students' outweighed the language used. Further to this, despite her entity language, P2 suggested the types of intelligence feedback socialised to students were important, however these were influenced by factors such as rapport, knowledge the individual student and experience within her teaching role.

For the majority of the observation, neutral feedback was socialised to students, with P2 noting that neutral feedback were important to focus students, create a positive working environment (by not shouting) and motivating students to stay on task. It appeared as though P2 was most concerned with establishing and maintaining a positive and collaborative atmosphere, between students and teacher, through feedback and overall approach to teaching. A part of this environment creating was linked to her intelligence belief, however P2's behaviour was also guided by other beliefs – such as teacher-student relationships and classroom environment.

4.7 Participant Three (P3)

4.7.1 Questionnaire Data

Participant three (P3) was a 32 year old, British female, having taught for 10 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 1 (Appendix 9). According to the intelligence belief self-report of Dweck (1999) she identified as a mixed theorist, scoring 2.25 overall (although bias toward an incremental theorist: categorised as 1 - 2). She had previous engagement with mindset training through INSET in school.

4.7.2 Observational Data

The class observed was a year 9 mid-ability English class. Of all feedback in the observation, 29.6% were categorised as incremental, 2.7% entity and 67.6% neutral. Observational results indicated neutral feedback were most frequent in P3's observation. Comparatively, P3 used more incremental than entity feedback.

Table 4.9 P3 Observation: Theory of Intelligence Feedback Frequencies

P3	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***29%***	***3.4%***	***67.6%***	***100%***
Frequency	***42***	***5***	***98***	***145***

Across the observation there were high uses of motivational language (26.3%) and feedback praise (23.4%), with no instances of feedback criticism or comfort feedback. Instances were discussed in the interview.

Table 4.10 P3 Observation: Catagorised Feedback Percentages

P3	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	4%	0%	23.4%	19.9%	19.9%	5.3%	0.6%	1.2%	26.3%	100%
Frequency	7	0	40	34	34	8	1	2	45	171

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

The table below presents the percentages of each of the codes in relation to theory of intelligence feedback (e.g., incremental, entity and neutral):

Table 4.11 P3 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	57.1	14.3	28.6
Fb-	0	0	0
Fb+	0	2.5	97.5
Fb	0	0	100
C	94.1	5.9	0
Sf	75	0	25
Cf	0	100	0
G	100	0	0
ML	0	0	100

All goal structure related feedback were incremental, although there was only one instance of this feedback type. Challenge feedback was the second highest of incremental feedback at 94.1%, while failure/error feedback were the most frequent for entity feedback at 14.3% (excluding the one instance of comfort feedback at 100% entity).

4.7.3 Interview Data

Across the interview, data were coded across 63 individual codes and all data coding accounted for 223 in total.

Failure/Error

When discussing failure and error, P3 identified instances where she believed her students were faced with repeated failures, on the same task – notably due to students' ability (the class in discussion was a low ability class, year 10 set 5). P3 identified that answers provided by students were usually too vague, or students would continuously provide wrong answers. According to P3, it was particularly year 10 set 5 that class experienced many failures before arriving at answers, occurring on a daily basis in her lesson. Despite the class failures, what appeared to be important to P3 was identifying ways to overcome failures through strategies, stating:

> *P3: So I suppose, just wherever possible, just try to rephrase the question… but then, obviously, give them steps to be able to access the information. Rather than just give... and if they still didn't get it, I would probably say to another pupil, right, such a body can you help them out and explain what you've gone to and why. So, it's kind of coming from the kids rather than me…*

Here, P3 noted that using other students to explain answers in their own words (rather than teacher lead) was helpful in her teaching; particularly if P3 had attempted multiple way to assist students. Further to this, P3 identified that the strategies used in response to failures and errors were different depending on which classes she was teaching, and the ability of the students. For example:

> *P3: In terms of how much I have to break Macbeth down for these [lowest ability class]. Compared to the level of detail I need to go into for set 1 [highest ability class] for top marks. It would be very, very challenging to have someone like Milly sitting here just thinking 'I'm still not clear who Lady Macbeth even is…' And I'm trying to go into detail like, with characters… so… but I can't really see a way around it.*

Here, P3 made comparisons between her highest and lowest ability classes, defining high and low ability by in school setting; based on a combination of individual and national data. P2 identified that her responses to breaking down questions was dependent on the class and the individual. P3 believed ability setting altered students effort. For example, P3 identified the lowest ability class as experiencing the most failures, however comparatively she believed the upper ability sets (e.g., set 1 and 2) were lazy. It was P3's belief that higher ability students felt entitled to not work as hard, as they did not experience as many failures:

> *P3: I think I'm in set 1 and I'm the best at everything. And it's like 'well actually you're not and you're not working hard enough'. So, I think some of mine in set 1 now, when they're looking at their marks and some kids in set 3 and 4 have worked hard and they've got the same as them, they're a bit… like… mmm… maybe I need to get down off my pedestal…*

The above quotation suggested that P3 believed failure, in relation to both students' targets and P3's expectations of the individual, could also be as a result of lack of effort; rather than not having the ability. Therefore she believed a lack of effort, resulting in failure, may require students to be reprimanded; as opposed to providing strategies to assist learning. On the whole, P3 responses to failure/error altered depending on her beliefs about individual students, individuals' ability, reasons for failure and strategies for learning.

Criticism Feedback

Criticism feedback was not observed, although briefly touched upon in the interview. P3 identified that some of her students had "fallen off the bottom", indicating students' results were poor in relation to her expectations and her knowledge (e.g., considerations to social background, prior attainment, behaviour, effort and interactions with students) of what some students should be achieving:

P3: I mean, some of mine have absolutely fallen off the bottom… because they've not worked hard enough… They've not. They really, really haven't, so I've been very, very harsh with them with the mock results because, yeah I expect more from them... And I know they've been prepared better in class, and actually on paper they can do better.

Although criticism feedback was suggested by P3 (e.g., "I've been very, very harsh with them"), it was not indicated what 'harsh' was or what feedback was given to students. The above quotation, however, does suggest that P3 enacts in accordance with her beliefs about students.

Praise Feedback

When discussing praise feedback P3 had several beliefs:

P3: Yeah, I think… I know I'm not as good as it as I should be… but I think that's because… I don't know where this belief has come from, but I have a belief that praise should be genuine. It shouldn't sound patronizing.

CR: Okay

P3: and that it shouldn't be for things that you expect anything. So for example, I know sometimes you get advice if you've got a difficult class, every time they pick up a pen, to praise them, well I don't agree with that. Because I just think well that's something that I'm expecting them to do. So why am I praising them and not everybody else? So… I would like to think that… I talk about, I try to at the end of a lesson, if they work well, say right get packed away, and I try to make some kind of comment about, you know, I'm really pleased about the way you've done this Sarah, or I'm really impressed, you're already on your way to analysing Shakespeare!

P3 identified that her use of praise in teaching had to be genuine and not for small tasks, which was also reflected in their observation. Praise feedback in the observation was noted 23.4%, however all instances were neutral in relation to theory of intelligence. Rather, P3's praise feedback was positively valanced in relation to student answers (e.g., well done Brianna!). Irrespective of P3's self-reported theory, what P3 noted as important to her, was to base praise on the individual, as P3 identified:

P3: I'd like to think that I praise them more based on what I know of them.

General Feedback

General feedback was used on various occasions across the observation, accounting for 19.9% of all feedback. General feedback appeared to be in response to students' answers and work, predominately when students answered questions. For example a student answered a question and P3 responded with "okay" or "yes", in acknowledgement of answers. General feedback was not discussed directly, however could perhaps be linked to P3's beliefs about praise – which should be genuine. If answers were easy for a student or what was expected by P3, then students' may not necessarily be praised and rather general feedback provided as an acknowledgement of the answer.

Challenge

There were several examples of challenge use across the observation, both incremental and entity based. In one task, P3 set students closed questions to answer as a starter activity. The purpose of the task was to recap previous knowledge, and questions were designed to get progressively harder; indicative of an incremental practice. Within the observation, when the student were completing the task, P3 identified that question 2 was not as important as the other questions and students "didn't need to worry about it". Consequently, this socialised that students didn't need to make an effort on that particular question, as it was "too hard", and students were spending too much time on it. As a result few students attempted this question, upon reflection P3 noted:

> *P3: So, maybe I shouldn't have said that, that I'm not bothered about that question (laughs)*

However, when observing P3 there was many instances of challenge feedback to encourage pupils to persist. These included encouraging students to answer more difficult questions and scaffolding answers for students – in order to challenge and elicit a response of higher thinking. In addition to this, P3 stated she felt as though her approach to teaching was valued by students, as she regularly challenged classes. She believed students were challenged less across other lessons. P3's attributions for students' lack of challenge from other teachers was as a result of ability setting. She commented on student perception within her class:

> *P3: because I think now they maybe value… the fact that I'm not just teaching them like 'right you're just bottom set, com'on let's just do like baby work' I am actually trying to push them to pass.*

Overall, behaviours and the interview discussion suggested P3 predominately engaged in incremental challenge behaviours, through her high use of challenge with students.

Strategy Feedback

As previously noted, strategies were common in P3's practice, and P3 was aware of this providing examples:

> *P3: Making like, well I try and make the instructions really, really clear. Then repeat them just to make sure they are, kind of like you know, only a couple of times. Then I give them like, clear time limits so they know they've got a focus.*

Time limited tasks for students were observed also, which P3 stated, provided a focus for individual students. In addition to teaching strategies across all classes, P3 had specific strategies for individual classes, again these were related to class ability:

> *P3: So, for example, 10 set 5 who I've just been teaching, who a lot of them, they resort to 'we're just thick' kind of 'what's the point?'. A lot of my teaching with them is about, getting them to understand that they don't have to do everything. So, for example, when we've been looking at some 10 mark questions this week, I've said to them, well at the moment we are all focusing on getting 5/10 for everything. If we get half marks on everything, that's a pass.*
>
> *CR: Yeah.*
>
> *P3: You know, and starting to drip feed into them that it's not about looking at something, thinking 'oh when I can't possibly get all 10.' But if you can get a few on everything, and just trying to… And actually, the other day, I asked erm… I asked them right, so remember, what are we aiming for in these questions? And Duncan actually said 'well we're aiming for as many as possible out of 10, but a 5 or a 6 is good for now…'. So, I'm going it's sort of slowly starting to get in.*

The examples are both related to individual students as well as larger strategies for the class. For example, gradual development ("they don't have to do everything") and developing knowledge over time ("drip feeding"). Overall, P3's use of strategies were present in the observation and P3 was able to draw upon examples used in other lessons. From the interview, P3's approach was suggestive of an incremental feedback though encouraging students to persist, make an effort and overcome challenging aspects of work.

Comfort Feedback

Although there were no instances of comfort feedback within the observation, P3 identified instances where students had self-identified as "not very good" at English. The quote below was chosen in order to demonstrate P3's response to this phrasing, which when used by a teacher is a form of comfort feedback:

> *P3: And then, I try to give the message that if they struggle with something then they need to try and identify ways that they can help themselves and ways that they can get other people to help them. Erm… So, like, obviously, I get all the time 'I'm just not good at English, I'm just not good at English' and I'll say to them, right 'nobodies just not good, they can tell me something' and then usually by the end of the conversation they'll narrow it down and I'll say like right, well you've identified one bit that you're struggling with. And I'll say 'but you're fine in all the others, so that's what you focus on!'.*

Within this example P3 socialises an incremental theory, by providing the students with ways to break down which sections they might be struggling with. Consequently, it was indicated that P3 does not use comfort feedback within her lesson, as she believes students only need to identify areas of weakness within a subject. As opposed to being inherently 'just not good' at English.

Motivational language

Motivational language was another area where there were many instances in the observation, with 26.3% of all intelligence feedback identified as motivational. P3 believed her use of motivational language was to ensure individuals were focusing and getting on with tasks, whilst also trying to maintain calm:

> *P3: Well I want… Like a calm environment where everyone's listening. So, if I'm saying like, shh, if I just do a little 'sh, sh' it's because I'm conscious I want everyone focusing and listening, but I don't want to interrupt the whole lesson by having a massive go. And I don't really feel like it warrants having a big go. It's just like sh, sh, a little reminder to them to like pipe down, and then we carry on. And then only if they keep doing it after that, then you would say…*

Motivational language was a large aspect of P3's teaching, as she expressed high expectations across all aspects of work. She believed student's behaviour was a contributing factor to learning, and that maintaining calm, focus and high expectations would contribute to students being on task; achieved through her motivational language.

Goal Structure

Tasks in P3's lesson were both closed (beginning starter task) and open ended (group task) – although there were no verbal goal structure references in the observation. Despite no observable instances P3 did discuss her beliefs about outcomes:

P3: I think their outcomes are important in term of, if I know, what I think they're capable of and they don't achieve those. I would have considered myself to have failed…Whereas if I know they have worked as hard as they possibly could, and that they've come such a long way and I know that they are happy with what they've got, then I would be happy with that.

Here, P3 identified that outcomes are important, however P3 would consider themselves to have failed as a teacher, if students didn't achieve what she believed them to be capable of. Student goals were therefore combined with teacher goals, which suggested P3 was again concerned with individual progress and a student centred approach, as opposed to students' competence (e.g., performance goals).

Internal and External Factors

P3 noted various external factors affecting her practice, for example behaviour of students, setting, exam pressures, lack of support from senior leaders and social backgrounds of individuals. The extract below is an example of P3's beliefs about behaviour, which affected her beliefs about mixed ability groupings and practice:

P3: I mean I think, in an ideal world, if every kid… if you could guarantee that every kid was going to behave… think mixed ability sets would be the way forward. If you knew you were going to have like… So, along this corridor you were going to have 5 classes that all were mixed ability to try and help all of them up, but we guarantee you no behaviour problems, you'd be able to do it…

Further to this, P3 discussed her beliefs about the external factors affecting students – such as social backgrounds. P3 noted some students couldn't work together because they didn't have the social skills or had additional needs, again examples where P3 was required to consider her practice:

P3: The social factors, when you get kids who won't engage in ideas and work in pairs… well how do you do that when you've got mixed ability and you're trying to bring them all up…. Yeah… So many I think social factors, and behavioural factors affect it as well. Whereas I think like, if you had…. A hundred kids who were all willing to learn and engage, I think you could do mixed ability and make it work really, really well…

CR: Yeah… but a hard thing, isn't it…?

P3: Yeah, with no kids who needed extra time… or statements, or things like that. Because they're all things you've got to factor into your teaching. So, 100… like I said, kids with no external issues, I know there's no such thing, but… (laughs)

P3 noted that students, in an ideal world, would not have external issues – however the reality was that teachers needed to account for external factors, and therefore plan, feedback and react accordingly.

4.7.4 Summary

Summarising data from P3, it was noted that her instruction and interview were reflective of incremental beliefs. This was reflected in her incrementally based feedback (at 29%) in comparison to entity intelligence feedback (at 3.4%) across the observation. As well as in the interview where she provided various examples of incremental strategies and feedback to assist pupils in the face of challenge. P3 frequently reiterated the importance of effort in her lessons. Her self-reported belief was identified as a mixed-theorist, at 2.25, although more bias toward incremental beliefs. Despite her mixed-theory, she expressed strong views about the role of intelligence feedback, particularly in relation to her school context – where ability setting, she believed, was detrimental to progress.

P3 expressed that there were many barriers to her teaching, notably as a result of behaviour and insufficient support from senior leaders. From the interview, P3 reflected on various video observation segments, and at times noted she was not aware of her behaviour. She believed that it was social factors, behaviour and ability which mattered to students' progress; while having experience across classes and with different pupils was important to her as a teacher in order to assist pupils as best as possible. It is difficult to conclude if P3's theory of intelligence dictated her practice, although she did display behaviours typical of incremental and entity teacher beliefs in the observation. It was noted, however, that P3 displayed high levels of incremental behaviour in her observation.

4.8 Participant Four (P4)

4.8.1 Questionnaire Data

Participant four (P4) was a 29 year old, British female, having taught for 7 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). She was teaching at school 2 (Appendix 9), an inner city faith academy. According to the intelligence belief self-report she identified as an incremental theorist, scoring 1.25 overall. She had previous engagement with mindset training through INSET in school.

4.8.2 Observational Data

The class observed was a year 10 (GCSE) mixed ability English class. Across the observation, P4 display entity feedback a total of 26 times (14.9%), comparatively to 12 instances of incremental feedback (6.9%). Neutral feedback was noted 136 times across the lesson (78.2%), therefore most frequently observed. Reviewing the coded observation, P4's intelligence feedback consisted of both incremental and entity, however there were more uses of entity feedback comparatively. Thus, P4's observational data did not always align with her self-report belief of an incremental theorist.

Table 4.12 P4 Observation: Theory of Intelligence Behaviour Frequencies

P4	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***6.9%***	***14.9%***	***78.2%***	***100%***
Frequency	***12***	***26***	***136***	***174***

Motivational language was observed most frequently in the observation at 47.8%, while there was also high use of challenge feedback (23.6%) and neutral feedback (20%). There were no instances of criticism feedback, comfort feedback or goal structure.

Table 4.13 P4 Observation: Catagorised Feedback Percentages

P4	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	2.9%	0%	4%	20%	23.6%	1.7%	0%	0%	47.8%	100%
Frequency	5	0	7	35	41	3	0	0	88	174

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

The table (4.14) below presents the percentage breakdowns for each of the intelligence categories, incremental, entity and neutral. Comparatively there were more instances of neutral feedback, however in her challenge feedback P4 displayed more instances of entity feedback:

Table 4.14 P4 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	40	40	20
Fb-	0	0	0
Fb+	0	0	100
Fb	0	0	100
C	20	60	20
Sf	33.3	0	66.7
Cf	0	0	0
G	0	0	0
ML	0	0	100

4.8.3 Interview Data

Across P4's interview, there were 110 individual data item references in total across 37 codes and themes.

Failure/Error

Within the observation P4 responded to many instances of student failures and errors in learning. At times, students were given the answers directly, which accounting for 40% of entity feedback of failure. P4 did, however, encourage students to develop answers, accounting for 40% incremental feedback. In responses to failure and error, it was also noted that additional feedback was provided in response to failure – which encompassed other codes. For example, student failure (F/E) was overcome through P4 providing strategies (Sf) and challenge (C). Despite an equal balance of failure intelligence feedback, between incremental and entity, when discussing failure and error within the interview, P4 used predominately incremental language. This was reflective of her self-reported belief. For instance:

> *P4…I'd say they've all got different ideas about what they can do in English and what they can't do in English. And they're really, really pressured by targets.*
>
> *CR: Okay*
>
> *P4: So they suffer with a real lack of confidence, because of the targets. And even from the outset when I got them, it was 'I can't do this I can't do that'.*

Within the above extract, P4 noted that students in English held preconceptions about their own abilities, and suggested targets may seem unachievable to students. She believed that students in the class observed had an "I can't" approach to work, indicative of students own entity theory of intelligence:

> *P4: Yeah yeah, but it's got to the point where they're 'I don't want to do this anymore, I've had enough of this..' like, we've got nowhere to go. So they're in a slightly different position but they seem, they still seem to have this mindset of 'can't do it'. And even if I say to them 'com'on you can do this, this is really good, this is really good – yeah but it's not, is it?' 'Well yeah, it is good… have you listened to anything I've said?!'.*

In order to counteract students' comments, P4 believed she needed to develop confidence in the students. In her opinion, developing confidence would encourage students' persistence across difficult tasks and failure. In addition, P4 stated confidence development could also be achieved through providing strategies for students' to work through tasks, which was noted on several occasions across the interview by P4.

Criticism Feedback

Within the observation there were no uses of criticism feedback. Furthermore, P4 did not make any criticisms surrounding students or their work – therefore, it was not possible to comment on this code. On the contrary to criticism, P4 expressed her inclination to use more positive feedback towards student and her language about students was also positive, on the whole, across the interview.

Praise Feedback

There were low uses of praise feedback across P4's observation (4%) and all instances were neutral in relation to theory of intelligence – however, positively valanced (e.g., "excellent"). Despite low uses of praised feedback observed in the recorded lesson, P4 reflected on her use of praise within the interview, identifying how she believed she praised:

> *P4: I think the praise that is what they're doing at that point in time. But really, it sounds bad, but, I think I don't think about what they've done at home or before that point…and really I should really, it's part of the process. I should be showing that they're linking things together, but… I just deal with whatever's with me at the particular point.*

P4 identified that praise is "part of the process", and suggested that all work is a contribution to a student's overall achievement. P4's reflection did, however, suggest that she felt she could do more to praise students, as she usually dealt with the present situation. Further to this, P4 commented on her praising of knowledge the individual, which was an additional contributing factor to her use of praise. What P4 believed, praising based on knowledge of the individual, and what P4 did in teaching (e.g., praising in the moment) were at times misaligned.

General Feedback

General feedback within P4's observation consisted of acknowledgement of correct answers, however this was both detached from theory of intelligence and non-valanced, for example "okay, right, yes". When discussing P4's beliefs about students' beliefs of intelligence, she noted that the majority of students in the lesson observed were aware of their setting (e.g., the lowest ability class). Because students were aware of their low ability status, P4 believed that students felt as though they were not as clever as other students. Consequently, P4's interpretations, that students felt as though they were not as "clever" as everyone else, affected her own practice, as noted:

> *P4: Yes, I think they're very aware, that class in particular, they are very aware of the fact that they feel as though they're not as clever as everybody else. So I don't want to make them feel inferior about that. And I think it was a couple of months ago now, erm… I can't remember what it was called… they did a drama about teachers ignoring them and not acknowledging them… and erm, jess was one of the performers. So as soon as she got back from that it was like 'well you shouldn't say that to me' so now when I see them I think 'I must make an effort to acknowledge them'. So I don't want to give them the impression that they aren't capable of achieving what other people are capable. I think whatever you put your mind to, whatever you want, you can get it.*

P4's belief appeared to affect her general feedback to students, where she frequently acknowledge pupils, rather than praised. General feedback accounted for 20% of feedback overall in the observation. Across the observation P4 appeared to reassure students through general feedback, noting "yes that's fine", which could be reflective of P4's beliefs about acknowledgements of pupils. Consequently, P4's beliefs about feedback were related to students as individuals and class ability.

Challenge

Challenge was the second most observed feedback in P4's lesson at 23.6%. Instances of challenge feedback were both incremental (20%) and entity (60%), however, more entity feedback was observed. Entity feedback included instances where P4 gave students answers, without prompts, or did not allow enough time for students to think about the answer after prompting. When reflecting on entity feedback of challenge, P4 noted that her instruction could have been improved, highlighting that providing answers "is probably quite wrong of me really, because they could get there eventually…”. Further to this P4 noted she was aware that at times she provides students with answers:

> *P4: I think I’m aware that I do that sometimes and I’ll go over, and they’ll ask me question and I think ‘why have I just given them the answer?’ (Laughs)*

However, she later went on to explain why she gave students answers and attributed her own behaviour to the wider consideration of the class:

> *P4: But I’m conscious of what the others are doing. Because you get some of them on task, and then, the others are doing something different. And you’ve got to be pottering around. So, I’ve got to get them to the point they’re at, so we can all move on together. And really, I think what I probably should do, is find out the answers for themselves. But sometimes it’s just easier to say, that is the answer so let’s move on.*

In this instance, P4 suggested giving a student more time would be a better strategy, although considerations must be made in relation to wider factors (e.g., time and all moving on at the same time).

Strategy Feedback

Strategy feedback was referenced across the interview, with P4 identifying that strategies were needed in order to progress students learning. As a result of strategic feedback, P4 noted that students would be left feeling more confident, which would result in more autonomous student work:

> *P4: Yeah, so if I think about the y11 set that have just left, I think well… a lot of them are very confident. And if you’re very confident I don’t need to keep telling you you’re doing something right because you already know that. But when I look at the lower ones – 10 set 5, 8 set 5 and erm… 7 set 5, I think you need that. You need me to say ‘yes you can do that… and this is, there are the steps in place.’*

What was apparent within this extract, was that P4 believed the lowest sets (e.g., low ability pupils) were most affected by a lack of confidence, and therefore needed more ‘steps’ than higher sets. In addition, P4 noted that within the classroom she worked with students in order to find the best solution for them, and therefore communication was a key aspect of her strategy feedback:

> *P4: So I think when you get a response from them that’s like ‘right I don’t know what that is’ it’s difficult to grasps what it is they don’t understand. So which bit of it is causing them the problem. So I can work it out. Because even*

if I paraphrase the question, they still won't know what I'm talking about. So I say, what is it you're trying to get at, what do you mean? So I try to ask them questions about that, rather than telling them the answers.

Consequently, P4 identified that she tried to question students and used questioning as a strategy to further understanding, where students may need additional support.

Comfort Feedback

Across the observation there was no use of comfort feedback. Within the interview P4 expressed that confidence development was an important element in order to progress students' academic development. As a result, P4 was concerned with assisting pupils to focusing on strategies to overcome challenges. The approach of P4, therefore, may be a potential factor as to no use of comfort feedback.

Motivational language

Motivational language was used most frequently, out of all intelligence feedback, at 47.8%. Within the observation, P4 provided frequent feedback to students though prompts, such as "shh", "let's go" and "I can see you". There were also non-verbal instances of motivation feedback, such as P4 putting her finger on her lips and looking at students, in order to indicate silence. When discussing uses of motivational feedback P4 made attributions for control, establishing calm and remaining quiet:

CR: What's the purpose of those types of…in terms of your teaching, what do you feel is the purpose of those?

P4: In my mind, I think it's trying to control the low level disturbance. So, trying to establish calm and quiet. I don't shout. I've never shouted. So I'm always trying to establish that calmness. Trying to keep them a bit quieter… so that they're actually listening to me. So maybe not having a purpose as such.

P4 noted that although she was attempting to establish quiet, she didn't feel as though her motivational feedback had a purpose. P4 eluded to the use of motivational feedback as a way to maintain calm, which she believed was valued by students. However, she was also aware of her use of motivational language to gain control:

CR: So are you… erm… would you be aware of the fact that you do those types of things?

P4: Yeah

CR: So it's something you think about before you do it?

> *P4: Yeah…because I can feel myself, I repeat it. And I'd do the exact same thing with any other class. I can feel myself doing it. And, you need to stop doing that, and try and do something else. (Laughs)*
>
> *CR: Why do you think that, you need to stop doing it?*
>
> *P4: It think because sometimes it's not as effective. Maybe. Maybe something else might be…but I don't know what that would be. I would have to have a think about that.*

Her practice, on these occasions, was guided by her beliefs about students' perceptions of the classroom environment. For example, ensuring students could ask questions:

> *CR: Yeah…and you said before, you don't shout, is there a reason you don't shout?*
>
> *P4: Not really…I just think…Its just general…I think because students have always said to me, I like being in this classroom because it's really calm, and there's no shouting. And I think, well okay, that's a good thing. And it was interesting, I had a conversation with Stephanie, who's sitting towards the front there… And she said yeah, yeah I like the fact that you aren't shouting. I feel like I can ask questions and things like that. And that's what I like. That's what I like student's to feel like in my classroom, but I've never really thought of any other way to try and get them quiet… without being really negative.*

Goal Structure

There were no instances of goal structure in P4's intelligence feedback, however, the tasks set related to previous work and were an extension of the week before. The questions were predominantly teacher lead, with many instances of classroom discussion among students and question and answer tasks. Questions were predominately open-ended for students to develop their own answers, before clarification. P4 discussed on many occasions the use of targets, however felt as though targets caused students to feel pressured, particularly in lower sets. Again, P4 believed that confidence was a key element of academic development, and when asked what was most important for student outcomes, P4 responded with:

> *P4: I think they need to, in literature, they need to have a solid understanding of the text we're studying. And they need to… apply that knowledge to something they may or may not have seen before. But for them specifically, I just want them to become more confident about the skills they have got already and I want them to develop them a little bit more so that they can achieve what they want to get out.*

Internal and External Factors

Discussing factors affecting teacher practice, P4 noted that 'intelligence' could change as a result of external factors. Notably students' social backgrounds and parental support:

> *P4: I think it's changeable. You can't…you can't…really put a measure on someone's intelligence. It can change on factors and what they have around them and what they do in school.*
>
> *CR: Yeah, so when you say factors around the, what do you mean?*
>
> *P4: I think, probably their home lives, the encouragement from home. And anywhere else they might access encouragement as well. I think..*

P4 believed parents, from her experience, were supportive of students' progress, recognising that students were being provided with an opportunity in school to develop and do well. P4 identified that her role was also to support students in the best possible way, regardless of students' social background and parental support:

> *P4: So, what can we do to help support this child. And it's only a handful that sort of will say, well you know, it's your responsibility, you get on with it. Erm… And most of them are really supportive in that respect because it's like, 'you have only got this one opportunity, you've got to make the most of it and you've got to sort it out'.*

Later in the interview, P4 identified that some of her habits (e.g., internal factors) were possibly a hindrance in her teaching. She believed her use of motivational feedback (e.g., shh, okay, right) was not effective. Although she was not aware of another other strategies to use, indicating additional knowledge would be a support within her role:

> *P4: Yeah…because I can feel myself, I repeat it. And I'd do the exact same thing with any other class. I can feel myself doing it. And, you need to stop doing that, and try and do something else. (Laughs)*
>
> *CR: Why do you think that, you need to stop doing it?*
>
> *P4: It think because sometimes it's not as effective. Maybe. Maybe something else might be…but I don't know what that would be. I would have to have a think about that.*

4.8.4 Summary

Summarising P4 data, P4 expressed strong incremental beliefs in the interview. Although her observational data highlighted more instances of entity feedback (at 14.9%) comparatively to incremental feedback (at 6.9%). The majority of entity feedback was noted in P4's use of challenge, where she frequently provided answers to students - which does not encourage persistence across challenge (e.g., an incremental form of feedback). P4's attributions for providing answers, were given based on her beliefs about ensuring students were progressing across already challenging tasks through providing answers, to what she believed were, small challenges (e.g., spelling of words). What was more important to P4 was to ensure students were focusing on the challenges that would ensure they achieved on the exam, rather than spending too much time on smaller challenges.

For the most part, across the interview, P4 expressed strong beliefs about providing students with opportunities to develop confidence. Confidence development was a key area of her practice, as she recognised that student ability, failure and setting could contribute to a lack of confidence. Through confidence development, P4 expressed her incremental beliefs in the interview, by emphasising support, direction and a calm environment – where students could feel comfortable to ask questions and ultimately progress.

4.9 Participant Five (P5)

4.9.1 Questionnaire Data

Participant five (P5) was a 35 year old, British female, having taught for 11 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 2 (Appendix 9), an inner city faith academy. According to the intelligence belief self-report she identified as an incremental theorist, scoring 1 overall. She had previous engagement with mindset training through own research.

4.9.2 Observational Data

The class observed was a year low ability year 7 Maths class. Across P5's observation, there were few uses of entity feedback (1.9%), some use of incremental feedback (27.2%) and high uses of neutral feedback (70.9%). Comparing observational results to self-reported theory of intelligence, P5 used a combination of incremental and entity feedback –although, noted, small use of entity feedback. Consequently, P5's intelligence feedback was not always aligned with her intelligence feedback.

Table 4.15 P5 Observation: Theory of Intelligence Feedback Frequencies

P5	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***27.2%***	***1.9%***	***70.9%***	***100%***
Frequency	***28***	***2***	***73***	***103***

When further analysing intelligence feedback, data indicated praise feedback was used most frequently by P5 (24.2%), as well as motivational language and neutral feedback (both at 21.3%). There was no use of comfort feedback or criticism feedback within P5's observation.

Table 4.16 P5 Observation: Catagorised Feedback Percentages

P5	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	12.6%	0%	24.2%	21.3%	15.6%	2%	0%	3%	21.3%	100%
Frequency	13	0	25	22	16	2	0	3	22	103

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

Presented in the table (4.17) below are the percentages for the individual observational codes, in relation to the incremental, entity and neutral feedback types. Data indicated entity feedback was only present in P5's use of challenge, as discussed in the interview (see P5, Challenge):

Table 4.17 P5 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	84.6	0	15.4
Fb-	0	0	0
Fb+	0	0	100
Fb	0	0	100
C	87.5	12.5	0
Sf	50	0	50
Cf	0	0	0
G	100	0	0
ML	0	0	100

4.9.3 Interview Data

Interview data were coded a total of 171 times, across 49 themes and codes.

Failure/Error

Within the interview, P5 express her beliefs towards failure and error, which were aligned with her self-reported incremental theory. P5 explicitly stated that in her teaching, students' mistakes across learning did not matter. She also drew upon a previous experience where she exhibited incremental behaviours towards students, for example when unsure of a spelling, as expressed in the following extract:

> *P5: Yeah, I want them to know that actually it doesn't matter if you make a mistake. You know not in maths lessons, say if I'm in form… and I say 'I can't remember how you spell this' you I know sometimes you can't remember. And I was stand in front of the class with a dictionary and the girls are saying 'miss I know the answer!' and I'm saying 'I know you know the answer, but I think it's good practice for me to just look in a dictionary and check the answer!' Because I want them to see me using those things, rather than just… going through...*

Within the observation there was an instance where a student had incorrectly answered and therefore failed. In response, P5 persevered and provided the student with prompts, until the student answered correctly. P5 drew upon many examples of encouraging this student to work, particularly as she had additional needs which required support and strategies.

Within the interview, it was apparent that many of her students faced failure, as she drew upon several examples. Therefore, P5 identified it was important to encourage students and also develop their confidence. She believed confidence was a key element of students' achievement, as this would encourage students to persevere. P5 identified that confidence would contribute to academic development. As well as development for life challenges and failures outside of school:

> *P5: As long as we can give them the confidence to do what they need to do and be kind of functioning in the outside world. If they can achieve a GCSE as well, that will come with it. Because if they've got that confidence they're willing to try and willing to learn. As far as I'm concerned that qualification comes with the confidence. It's…intrinsically linked. And I think that a child who isn't confident won't necessarily revise because they think 'what's the point, I can't do it anyway'.*

Criticism Feedback

Within the interview there were no instances of criticism feedback, however, P5 did note that she believed some students lacked confidence because they were not praised. P5 expressed that she was more concerned with praising students, which was also reflected in her observation (praise feedback was 24.2%). P5's beliefs about praise may be one of the reasons why criticism feedback were not present across data, as criticism feedback contrasts praise by nature.

Praise Feedback

Following on from the previous section (criticism feedback), P5 made the following statement about her beliefs about her use of praise:

> *P5: I would hope I give lots of praise. I think sometimes, we do tend to forget, but hopefully with bottom set. But actually one of the reasons why they maybe in that set is because they haven't been given that praise before and that knocks their confidence and they don't think they can do it.*

Praise feedback to P5 was highly important, as she believed praise also contributed to students' confidence (as discussed in failure/error for P5). P5 believed that praise could be a large contributing factor toward counteracting student setting, which had negative effects on confidence. Praise would raise confidence, and as a result, improve skills and attainment. For example, P5 noted that those students in lower sets maybe praised less, as their academic outcomes might be lower and students experience less achievement academically.

> *CR: to you then, it's [praise] more about development of confidence?*
>
> *P5: Yeah*
>
> *CR: Rather than intelligence, because confidence therefore…*
>
> *P5: Yeah*
>
> *CR: Leads to, them having a go, having a try..*
>
> *P5: Yeah and then that will get you those skills, and then build it.*

P5 displayed praise feedback most frequently in her observation. Although all instances of praise feedback were neutral, and therefore disassociated with a theory of intelligence. Praise was, however, positively valanced (e.g., well done, excellent work).

General Feedback

General feedback within P5's observation compromised of "okay" and "yes", in acknowledgement of students' answers, all general feedback was neutral. When discussing the use of feedback, P5 noted that "looking for little things" and acknowledging students was an important aspect of her teaching. The role of feedback for P5 was to motivate students within the classroom and engage them in learning. Again, with a focus on confidence development – a common theme across P5's interview:

> *P5: And it's like, you just know everything.. and I don't know anything. And it's that thing of, if I walk around the room going 'no', they're going to think 'but miss knows everything and I know nothing' whereas if you're constantly looking around and looking for little things and saying 'that's brilliant, well done, you've done that, oh that's lovely; that's a lovely presentation there' always try and find a positive. Just to get that encouragement, and just motivate them to actually be in the classroom and learn. And once you've got them in the classroom you can hopefully get them to have a go to develop their perseverance and develop their knowledge.*

Challenge

Challenge was briefly discussed in the interview, when P5 reflected on a "quick fire round". Within the quick fire task students answered questions as fast as possible, although unlimited time was given in order to provide all students with the opportunity to answer. The purpose of the task was to repeat strategies in order to work out answers, and therefore assist with knowledge retention. When exploring the quick fire round in the interview, the role of allowing students unlimited time in the task was discussed. P5 stated:

> *P5: Yeah I think it's probably confusing, but they've done that a lot and I don't think they've ever kind of questioned, because for them.. quick fire is as long as it takes. Because the idea is that they know, I want an answer from them all. And that's the reason. It's not because it's as long as it takes because you're not going to get it. It means you need to show me and answer on that whiteboard!*
>
> *CR: So, it's not a, erm, that there, is that suggesting that… it's not to comfort them, it's to say you've got to stick at it?*
>
> *P5: Yeah, you've got to persevere, you can't just sit there and everyone else has given an answer but I don't need to and we'll move on in a second. Because I want an answer from you all.*

Untimely, the role of the task was to attain an answer from all students, and therefore some questions were more difficult than others. Incorrect answers were discussed and developed as a class. The quick fire round was, according to P5, a normal part of her teaching and she believed students were aware of her high expectations within the task. Again, when discussing P5's approach to challenge, her attributions for feedback were indicative of her incremental theory.

Strategy Feedback

Discussing the role of setting in P5's teaching, she provided examples of how setting affected her teaching – notably it was setting of classes which affected her strategies in teaching. Strategies for P5 included the use of a teaching assistant (TA) for additional support (although not explicitly student strategy encouragement), praising a student to reinforce learning, and using strategies to involve students with specific needs in the larger classroom environment (e.g., scaffolding questioning). From P5's comments, it was noted she had a sense of knowing individuals students, and what strategies were useful in order to assist students work and develop confidence:

> *CR: So in terms of the actual setting, erm, how do you think that affects your teaching. In that knowing it's a bottom set. I mean does it affect your teaching?*
>
> *P5: It does in a sense of… like there's a student in there, who, is.. She's got dyscalculia. She struggles, she can so something one second then forget it a second later. But if she gets a question right, we make a big deal. Because it's like 'congratulations'. So, at the beginning of the year, whoever her TA was in her previous schools, when they were doing subtractions, the column method subtractions - instead of like…we used to learn it as borrowing one. But she says breaking next door… so whenever we're doing a subtraction on the board. It's ' what do we say Stephanie?'. And she shouts out 'breaking next door!' just to make her feel like part of the class. You know, it's more important to me that they feel valued, even if they get things incorrect. As long as they've had a go, rock on!*

Other strategies identified by P5 in the interview were the use of repetition, routine, getting to know what was expected and attempting to establish an enjoyable classroom environment. Again, many of P5's attributions and reflections appeared to align with her belief to enhance students' confidence, which in turn would make students (in her opinion) work and be motivated to work.

> *P5: I think to them, because that's something that we do all of the time, I think that's just.. they accept that. That's something that we will do, we will go back over it again and over it again. Repetition I think from September, they came in with such a good work ethic, and hopefully I came in and tried to make it as fun, let's just enjoy ourselves. Let's just have a go regardless. And now they just see it as, okay let's just have a go, that's just normal. They just see it as me. Just like... that's just what we do.*

In the above quotation, P5 explicitly used feedback associated with her self-reported incremental theory (e.g., "let's have a go regardless") – suggesting that her strategy feedback and self-reported incremental belief were aligned. Within the observation other strategy feedback was also observed, where P5 used scaffolding and asked other students to assist each other's understanding.

Comfort Feedback

Comfort feedback was not present in the observation. In addition, there were no references to the use of comfort within the interview with P5. The language used by P5, however, suggested that comforting students for a lack of ability was not an aspect of her practice. Rather, P5 was concerned with encouraging students across lessons.

Motivational language

Motivational language was used frequently across the observation, at 21.3% of all observed feedback. When discussing motivational language P5 made inferences that her motivational feedback was to get students to listen, suggesting that motivational language was used where students were off task:

> *CR: So it's just these little…so little things like that, you know, putting people's names in. So what's the aim of those?*
>
> *P5: Just where they've gone off task a little bit. You know, looking out the window, looking at someone else, or fidgeting. Just to get them back, because obviously that is the explanation how to solve it. So look at me, look at the board, I'm telling it to you – I'm explaining it to you. So that's why you need to listen right now.*

Motivational language was therefore important across the lesson to P5, as students needed to pay attention in order to gain understanding in the lesson. Further to this, P5 expressed different ways she tried to get students attention to motivate them – for example calling their name, or directly asking for their attention. Such instances (e.g., name calling, asking for attention etc.) were, however, described as a habit rather than deliberated:

> *CR: and is that something that you do.. obviously you do it deliberately, but do you need to think about that before?*
>
> *P5: No, it's just become a habit.*
>
> *CR: So, again, 'make sure you're looking at me, eyes to the front' because there's lot of time that erm across all lessons teachers do the 'shh'*
>
> *P5: I know, I hate the shh! I always try to do – right be quiet, focus! (laughs) but it just comes out as 'shush!'*

Goal Structure

Within the interview, goal structure was not discussed, however, there were various types of tasks across the lesson which indicated P5 was concerned with confidence and knowledge development (e.g., mastery goals). Initially the quick fire round was suggestive that students were socialised an entity theory, through encouraging students to finish fast and first. When discussing this in the interview, rather, it was identified that P5 was more concerned with all students providing an answer and expecting students to take their time.

Internal and External Factors

P5 noted within her interview a number of external factors affecting her practice and feedback. For example, students' social backgrounds, prior achievement, additional needs and support from other staff:

> *P5: Like there's a student in there, who, is.. She's got dyscalculia. She struggles, she can so something one second then forget it a second later. But if she gets a question right, we make a big deal.*

P5's expectations were noted as also affecting her practice, where students did not have additional needs she held expectations and interacted differently with students – based on her own knowledge and beliefs about the students (e.g., internal factor):

> *P5: Erm, but where, the others from them I'd have expected them to have that knowledge. So yeah, you get it, great. Okay what about you, what do you reckon? Because actually you know I know I expect it... you to know that. And that's the difference, the expectations.*

4.9.4 Summary

To conclude, P5 displayed 27.2% incremental feedback in her observed lesson and 1.9% entity feedback. Data indicated P5's intelligence feedback was bias toward her self-reported incremental belief, although it is important to note that there were some instances of entity feedback. The entity feedback within P5's lesson accounted for a lack of challenge and not assisting pupils through the challenge. Despite her entity feedback, there were many examples of P5 enacting her incremental theory. For example, sharing strategies for students to utilise when faced with difficulties on some questions and encouraging students to reconsider answers following failures.

In the interview P5's incremental beliefs were also apparent, when reflecting on her lesson. P5 discussed developing student confidence in her lesson in order to assist pupils' willingness to try and learn across setbacks. What was important to P5 was to ensure students were valued within the classroom. In addition, P5 noted that ability setting affected students' confidence, as she believed lower set students were not praised as much as higher ability sets – due to experiencing more failures. Consequently, ability setting was an external factor which affected both her practice and belief.

4.10 Participant Six (P6)

4.10.1 Questionnaire Data

Participant six (P6) was a 33 year old, British female, having taught for 10 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 2 (Appendix 9), an inner city faith academy. According to the intelligence belief self-report she identified as an incremental theorist, scoring 2 overall. She had previous engagement with mindset training through INSET in school.

4.10.2 Observational Data

The class observed was a mixed ability year 8 Art class. Across the observation P6 displayed neutral feedback most frequently at 72.8%, incremental feedback accounted for 26.2% of all feedback, while entity feedback was low at 1% overall. Comparing this to P6's self-reported belief (incremental theorist), feedback within the observation was both congruent and incongruent to the questionnaire. However it is important to note that entity feedback (1%) was low.

Table 4.18 P6 Observation: Theory of Intelligence Feedback Frequencies

P6	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***26.2%***	***1%***	***72.8%***	***100%***
Frequency	***27***	***1***	***75***	***103***

Further analysis of feedback types revealed that P6 displayed motivational language most frequently (38.9%), while there were also high frequencies of challenge feedback (24.2%) and neutral feedback (20.4%). There were no instances of comfort feedback or feedback criticism noted in the observation.

Table 4.19 P6 Observation: Catagorised Feedback Percentages

P6	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	1.9%	0%	12.6%	20.4%	24.2%	1%	0%	1%	38.9%	100%
Frequency	2	0	13	21	25	1	0	1	40	103

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

The table (4.20) below presents the percentages for each observation code, in relation to incremental, entity and neutral feedback categories – the entity practiced with P6's teaching were only observed in challenge practices.

Table 4.20 P6 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	100	0	0
Fb-	0	0	0
Fb+	0	0	100
Fb	0	0	100
C	96	4	0
Sf	100	0	0
Cf	0	0	0
G	100	0	0
ML	0	0	100

4.10.3 Interview Data

In the interview with P6, there were a total of 200 coded pieces of data, which were across 56 separate themes and codes in total.

Failure/Error

Within the interview P6 was asked to reflect on an element of the observation where a student did not know the answer. P6 gave the student additional time to think about the question. Given that the student did not know the answer, the section was coded as 'failure' as the student had failed to complete the requested task. P6 was questioned on her response to the students' failure and noted:

> *P6: Yeah… I'm just giving them some thinking time really, and sometimes, erm, it's for various different reasons dependent on the pupil. Sometimes they need that time to internalize it, because sometimes they will go quiet and figure it out. Sometimes they need to discuss it, they've been seated specifically, mixed ability…*

For P6 providing additional time was both a useful strategy for students to 'internalise' or work together, if requested, in order to answer. Therefore, intelligence feedback consisted of various types across one instance (e.g., failures and strategy). P6 went on further to state that not answering in the classroom was not an option, and therefore suggested failure was not an option. Furthermore, as P6 asked individual students questions, individual questioning and response to failure/error was based on her knowledge of the student. In the interview P6 stated individual consideration was to ensure students were supported and challenged, while also able to answer:

> *P6: If 'I don't know the answer' that's not an acceptable answer in my classroom. Well that's not an acceptable answer in my classroom. And they don't get a spokeswoman. Sometimes they do, but most of the time I choose whose going to answer… So they can't opt out, and it's something they've learnt over the year. So, then if I say 'I'm going to give you a couple of minutes' they know I won't forget, because I'm not going to stop. Because they have the ability, I know they do. Or they need to ask somebody else. If I know, and it's not their original idea... I'll say 'why is that'? So even if they take it, they have to build on it.*

Further in the interview, P6 noted that as a teacher she also reflected on her own failures. An example of P6 failing would be to give up on a student if they were unaware of answer, rather than challenging through additional strategies. The example below is also linked to strategies, however, the interview provided an insight into P6's beliefs about the development of student's and her own practice:

> *P6: If they genuinely do not know an answer to your question, are you just going to leave it there or are you going to get them to think this. Or is there other strategies that we can use to bridge the gap. So that's something we've been developing as a team to move forward with*

Criticism Feedback

Within both the interview and the observation there were no references to criticism feedback. From the interview and P6's beliefs about knowledge development, however, data indicated criticism feedback was not a key feature across her teaching.

Praise Feedback

Praise feedback was not discussed in the interview, however was present within the observation accounting for 12.6% of all feedback. All praise feedback from P6 was neutral and disassociated with a theory of intelligence, but positively valanced, therefore categorised as praise feedback. Examples of neutral praise feedback from P6 included “excellent”, “interesting” and “brilliant”, in recognition of students’ answers.

General Feedback

Similarly, with general feedback, this was not discussed in the interview, however present within the observation at 20.4%. General feedback differed from praise feedback as general feedback as was non-valanced and entirely neutral, although an acknowledgement of a correct answer; such as “okay” and “ohhh”.

Challenge

Challenge feedback was discussed at length in the interview, as P6 displayed various uses of challenge in the observation (24.2%) and was keen to express her beliefs. Of all challenge feedback 96% was incremental, with 4% entity. The 4% entity challenge feedback accounted for 1 instance, where P6 asked another student to answer (the “jump in” strategy), rather than providing time for the original student to answer. P6 discussed the purpose of using the “jump in” questioning strategy (asking another student to answer), and described jumping in as a “life line” in order to assist with confidence development:

> *P6: So it does hit their confidence. But also, it builds a culture of ‘if I say I don’t know the answer’, because I do think she knows the answer, or will do... most of them, some of the time are ridiculous anyway because we do the ‘big thinking’ questions. And its art. Like what would you do if bugs were the size of humans – it doesn’t really matter what the answer is, it’s just getting them to discuss... so that was the idea. We also looked at some lessons where it was done really well, and it was like they’d had an opportunity to discuss it and maybe it was the branching off part that they didn’t really know, or maybe they could use someone to jump in and help.*

What appeared to be important to P6 was providing opportunities to discuss and create a culture of discussion, although P6’s comments at time were contradictory. Contradictory comments arose when P6 stated the answer did not matter, despite careful consideration and planning of questions for individuals. P6 also wanted to challenge students, and to build confidence, however, she believed this could be achieved through bouncing questions to other students. If students need questions to be bounced to others this could, perhaps, affect student confidence negatively – as students are left unaware of how to answer and not provided with the support to develop or challenge their thinking (e.g., through teacher questioning strategies). P6 did note, however, that her feedback and beliefs regularly contradict, stating "I know sometimes what I am saying and what I do actually believe clash, massively". P6 also discussed other ways she provided challenge feedback across lessons, for example, ensuring students practice different skills and techniques in order to challenge their thinking and learning. She stated in art students were, at times, "amazing" in one medium (e.g., pencil, charcoal, painting etc.) and a "one trick pony", unwilling to try any other mediums. Building on the above comments, P6 noted:

> *P6: One of the things I'm struggling with and constantly pushing, is that… not having a security blanket. And they hate it, but we force them to do it. Because otherwise they aren't going to meet the criteria. And it's not even about my idea of what makes a good artists or intelligence. It's essentially what's required for you to study at GCSE and beyond.*

Challenging students in the above paragraph was noted as "forced" and a struggle in P6's practice, with force arising in the attempt to remove students' security blanket. However, P6 felt the forcing of security removing was necessary to provide students with the skills needed to study at GCSE level and beyond – as opposed to her own beliefs about intelligence.

Strategy Feedback

Closely linked to challenge, through the consideration of strategies to challenge students, P6 discussed many uses of strategies in the interview. For example, using mixed seating plans – which included low, mid and high ability students working together. In P6's opinion mixed seating contributed to lower ability students gaining access to higher ability language, while providing opportunities for lower ability students to contribute through a combined effort.

> *P6: …always having what you consider having the lower students' ability together, they never get to consider what the higher ability student have or their higher level language, or the steps that the other students go through. So having them mixed up, in some way, will support them through it. But then maybe the higher ability student carries the table. So what I tend to do is, we do Haps map and laps, to High ability, middle and low. I might have the low with some middle and some middle with high. So that you don't literally have a low ability child relying on a high ability child. So it means that even if they've not had the idea themselves, they're absorbing because they're hearing that language and they're hearing that process.*

Later in the interview, P6 discussed other strategies for challenge, which were based on knowing the individual students in her class and planning questions beforehand:

> *P6: have these strategies in my head, but again... because I have a mixed ability class, I can't always rely on the original data. So I develop it, because I*

> *can ask them a question and they answer it like that – and then I think 'that was too easy'. So I always have... when I'm planning, I have questions, so I always have in the back of my mind 'well if she answers that... or what if she can't answer it?' and I've set it too high for her. And again, at the start of our pedagogy meetings – some people are like 'how do you feel about...getting them to jump in' and we discussed some ways it could be detrimental, because we have watched some teaching where they don't know, and then the kid in the corner who is 'me, me, me!'*

P6 engaged in a self-reflective process across her planning, in order to ensure students were challenge appropriately for the individual. Consideration of individuals was a common theme across the interview. While, strategy feedback reflected her incremental theory, for the most part, as P6 was keen to use strategies to further student knowledge.

Comfort Feedback

Within both the interview and the observation there were no references to comfort feedback. The language used by P6 was suggestive that comfort feedback was not a common feature within her teaching.

Motivational language

P6 did not elaborate on her use of motivational language within the interview. However, motivation language accounted for a large proportion of overall feedback observed (38.9%). P6 did briefly touch upon her belief about her use of motivational language, and when asked what the aim of her use of "shh, listen, com'on" was, she stated:

> *P6: I suppose to be focused, is the idea behind it... whether it leads to that...*

From this comment it was recognised that although P6 aimed to focus students through her motivational language, at times she was unsure whether motivational language was useful in her practice. Within the observation, however, it appeared as though students were aware of expectations and responded to P6's motivational feedback by being quiet and getting on with tasks when requested.

Goal Structure

Goal structure feedback was not noted in the observation, although tasks set by P6 were predominately open ended and provided students with the opportunity to make their own choices to develop work; with some direction. Given that P6's lesson was art, perhaps open ended tasks such as skills and technique development were common within the subject.

When discussing goals with P6, however, it was apparent that her beliefs about teaching, progress and targets was, at times, in opposition to her personal beliefs:

> *P6: Yeah...And again, I don't think it's fixed. Erm... And I also think it's linear. As in its just going to keep going, I think it can if you're determined. But I think you have peaks and troughs. So when you have targets, and when they have to reach that by the time they're 16, obviously that is my role… And I'm paid to sing to the hymn sheet. But on the other side I do see them as individuals and I'm like 'she's not going to meet that'… Do I think she's never going to meet it? I think she could do it she wanted to, but we've only got a year. I know sometimes what I am saying and what I do actually believe clash, massively.*

It was clear throughout the interview that P6 was aware of her role, which required knowledge development and target achievement, although this conflicted with her pastoral role and some personal beliefs. Within P6's pastoral role she was aware of students' individual backgrounds and context. Thus, at times her behaviour reflected her beliefs about individuals, while on other occasions behaviour was in accordance with role expectations:

> *CR: So is that another consideration as well, in terms of you have to think about them as individuals in terms of their background?*

> *P6: Yeah, for me it is extremely important. And that's why I've gone into the pastoral team. Because progress lead, although I am pushing progress, I'm the gap between home and the classroom. So I know that I'm constantly pushing progress and I know that often clashes with my personal views – however it is, sort of, the moral side of teaching that I do enjoy, because I have an overview.. I am in charge of the whole of year 12 and 13 and I get to have an overview of everything. When you're a teacher you're so focused on your own, and should be, you know and I think that's one of the joys – you can focus on your little cohort. And can really do everything that you can... but you have no idea what's going on outside. And you could be doing this intervention and that intervention and getting nowhere and the student is disaffected, not interested, you know, or a pain. But you have no idea why, but our role is to fill that in…and it's not a magic wand, and you don't just know that the reason she's taking, she's so vile to you on a Monday morning is because you're getting the end of what's happened over the weekend.*

Feedback was therefore guided by both her professional and personal beliefs about what defines achievement, and expectations for individuals students, based on their social backgrounds.

Internal and External Factors

Discussing targets and performance with P6, she noted a selection of external factors affecting her practice. For example exam content, target grades and subject expectations of Art within school – existing among other staff:

> *P6: Erm… you know, targets are set based on maths and English. So that doesn't transfer to their skills. We're also treated with a double edged sword, in that, 'we're only art' but on the opposite side, they use language, such as, if we're doing something creative in one of our pedagogy meetings, and we quickly put something together, they're all like 'oh my god, you're so amazing.. I can't believe you can do that, you're so clever!'*

An internal factor P6 identified was the combination of her roles, which required different considerations. Within the interview P6 was concerned with the development of the individual, and referenced students' social backgrounds as external factors which affect her practice and interactions with students. In contrast, P6 was required to teach students to work towards targets, based on subjects (English and Maths) which were unrelated to Art. Consequently, internal factors both supported and hindered P6's role – given she experienced a "clash" in her belief system:

> *P6: But then I also clash with myself. Because I teach sociology, so I have the academic stuff and obviously as the progress leader for sixth form I have to be pushing both sides of it. I have to be pushing the creative stuff and the academic stuff. So sometimes I contradict myself.*

4.10.4 Summary

Summarising P6's data, she expressed strong incremental beliefs in the interview and displayed predominately incremental feedback in her lessons (at 27%). Entity feedback was very low at 1%. P6's incremental beliefs were discussed through her identification of students who needed to be challenged, through using new medium in art. P6 was also concerned with fostering a learning environment for students to explore and make mistakes, recognising that this was part of the process of art.

Within the interview P6 also identified inconsistencies between her professional role and personal beliefs. Within her professional role she was required to ensure students attained specific results, however she was also very concerned with allowing students to explore and develop artistically – which did not always align with targets. Further to this, P6 held a pastoral role, overseeing year 12 and 13, which gave her insight into some students' home lives.

Consequently, knowledge of individual students, and their social background guided her practice – as she was aware of issues which may have happened, and alluded to not “pushing” these students as much based on this knowledge. Overall, both P6’s feedback and reflection were indicative of her incremental feedback. Although it was noted that her feedback was based on multiple factors (e.g., social background, beliefs about school systems and role as pastoral lead).

4.11 Participant Seven (P7)

4.11.1 Questionnaire Data

Participant seven (P7) was a 32 year old British male, having taught for 10 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection he was from school 3 (Appendix 9), a mixed gender academy. According to the intelligence belief self-report he identified as an incremental theorist, scoring 1.5 overall. He had previous engagement with mindset training through INSET in school.

4.11.2 Observational Data

The class observed was a mixed ability year 10 GCSE music class. Across the observation, P7 displayed neutral feedback most frequently, out of all feedback at 73.3%. Incremental feedback was coded at 23.3%, while entity feedback was 3.4% of all intelligence feedback. Overall, P7’s intelligence feedback was predominately neutral, with some instances of incremental feedback and low uses of entity feedback. Results from the observation therefore indicated P7 displayed both incremental and entity feedback, indicating self-reported belief (incremental theorist) was not always enacted in practice.

Table 4.21 P7 Observation: Theory of Intelligence Feedback Frequencies

P7	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***23.3%***	***3.4%***	***73.3%***	***100***
Frequency	27	4	85	***116***

Of all feedback categories across the observation, motivational language was most frequent (45.7%), followed by challenge feedback (15.5%) and strategy and praise feedback (both at 12.9%). There were no observed instances of comfort feedback, goal structure or feedback criticism.

Table 4.22 P7 Observation: Categorised Feedback Percentages

P7	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	1.8%	0%	12.9%	11.2%	15.5%	12.9%	0%	0%	45.7%	100%
Frequency	2	0	15	13	18	15	0	0	53	116

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

Percentages of each category in relation to theory of intelligence are presented below (Table 4.23). Data highlighted incremental and entity intelligence feedback were only visible in P7's challenge feedback:

Table 4.23 P7 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	0	0	100
Fb-	0	0	0
Fb+	0	0	100
Fb	0	0	100
C	88.9	11.1	0
Sf	0	0	100
Cf	0	0	0
G	0	0	0
ML	0	0	100

4.11.3 Interview Data

When coding the interview, 302 codes were referenced in total, across 78 individual codes.

Failure/Error

When discussing failure and error with P7, video footage was referenced for the purpose of stimulated recall. Within one section shown (related to failure and error) a student was working on a task where they had failed to answer the requested amount of answers, 5 in total. The student failing was Duncan, who only managed 3/5 answers. When P7 reflected on the video footage, he noted that it was important for Duncan to learn from others. Therefore, P7 was attempting to feedback to Duncan that failure was not an issue, as he could develop:

> *P7: yeah, I think that it's just a case of. I don't think the task was that much of a huge deal, to really, punish Duncan say 'why have you only got 3?' I didn't want to belittle him, in front of the rest of the class. So I knew we were going to talk about many different instances anyway, so the reason why I said put your pen down and listen, that's getting him ready to ensure he's going to*

> *listen to the next section and hopefully pick up the next instruments so he will know exactly how to answer the question next time around. And you know, do it a lot better. Maybe this is a bit silly of me, I didn't think the task at hand was that much of a big deal, to really change...between the two.*

Further, the language used by P7 appeared to be reflective of his self-reported incremental belief – using statements such as "he will know exactly how to answer the question next time" and "do it a lot better", in light of the discussion as a class. P7 did note, however, that the task was not a "big deal", indicating P7 may not have been aware of his response to failure, until he had reflected.

The same video section shown to P7, for failure/error, also related to speed of completion, as another student (Josh) finished first and had provided 5 answers, as requested by P7. P7 praised Josh for finishing first. However, upon reflection it was noted that although Josh provided all 5 answers, Duncan's fewer answers could have been better quality – despite the task being incomplete, on account of less answers than requested by P7:

> *P7: Yeah its maybe...the situation. Sometimes some people can finish a lot quick… it doesn't necessarily mean the quality of work is going to be better than the other. The two answers Duncan might have had, could have been a lot more insightful the language could have been a lot better. The choice of instruments maybe the reason why. And I think that was the power of the task...it was the reasons why they chose those instruments. Not I know five instruments I'm going to write those down. So that could've been one of the reasons as well. Praise Josh, you know he's got his pen down first, he's on task – he's very enthusiastic and he's finished it. Josh's thought process might not have been as deep as Duncan's. Duncan is probably trying to write a piece of music in his head using those instruments whereas Josh is like 'I know five instruments so I'll just use them'.*

P7 noted that both Duncan and Josh could have worked well for different reasons. Although the nature of the task was to provide 5 answers, and therefore suggested that Duncan had failed. Furthermore, Duncan was not praised for his efforts – regardless of P7 stating Duncan's answers could have been better thought out. P7 socialised entity feedback in practice through his speed completion praise, and neutral feedback in failure and error (e.g., no intelligence feedback reference to Duncan's two answers). The interview, rather, indicated P7's decision making in feedback was incrementally based, through consideration of individual, using class discussion to explore answers for future tasks and knowledge development. Thus, a misalignment between practice and belief.

Criticism Feedback

Criticism feedback was not present across the observation. P7 did discuss areas where valanced criticism may appear in his teaching, for example shouting at students – which could infer criticism feedback. However, P7 noted within his teaching that he does not agree with shouting at students, and that negativity was not part of his practice:

> *P7: I don't see the point. I genuinely do not see the point in shouting at kids. Too much. Just for the fact that it's not really solving anything, and a lot of the kids in this school, especially, the only communication that they have with their parents is through shouting. And negativity, in that sort of way. So, taking that out of the situation and helping them understand different points of view - you know, you're not doing the right thing. There's no need to shout.*

Praise Feedback

Praise feedback was coded 12.9% across the observation, with all praise feedback disassociated with intelligence feedback. Examples in P7's practice included "very good, well done" and "excellent". In the interview, P7's use of praise, following pupils' correct answers, was discussed:

> *P7: So. I think telling them, and I was genuinely impressed. You know, flute isn't something that kids would normally go to, they would usually go to the drums or a piano, or a guitar. And he chose something more elegant. And yeah, I was happy with his answer, so therefore, I am going to let him know that I am happy. It was just generic teacher praise, it was yeah I really enjoyed that answer.*
>
> *CR: So just to pick up on generic there. What you're saying there is praise generic praise....praise has to be... what's the word?*
>
> *P7: Genuine.*
>
> *CR: Genuine. Yeah.*
>
> *P7: Yeah! It has to be genuine, because if you come across as a fraud...the kids aren't stupid. They see right through you. I hope I don't come across as a fraud.*

Within the above quotation, P7 noted that his praise was "generic teacher praise" inferring that there may be different kinds of praise. The description P7 provided surrounding his praise was that it represented his happiness and enjoyment, as the student he was praising had answered with a unique answer. Further to this, P7 felt as though his praise had to be genuine as students have an awareness of praise which is earned. Genuine praise was reflected in the observation, where P7 praised students for well-thought answers and encouraged elaboration through additional challenge.

Further in the interview P7 noted that his praise was, however, differentiated for his pupils and that praise is combined with planning appropriate questions:

> *P7: I think so, with a certain level of differentiation. It would be fair to expect some kids to produce certain answers that other kids can't. But you've got to gamble… not gamble. But think ahead. If this kid doesn't get this answer, they're going to be disheartened. Probably not going to get as much work from them throughout the lesson, erm...yeah. And they're going to maybe have second thoughts about taking music. And that's a struggle that you get with kids taking music. I really don't get this, awh I'm not very good at this. Because you wouldn't really get that with English, or Science or maths. It is what it is. You're being taught that, and that's what you've got to show. Maybe a little bit...on a broad sense. Or more of a practical sense. You've got to play to the audience.*

In addition, it was also noted that P7 felt as though students in his subject (music) were more likely to make inferences about being "not very good at this [music]". Therefore it was important to consider praise and encouragement to ensure students' were not disheartened by failures. It was identified in the interview that P7 held beliefs about praise in music in comparison to other subjects, and that teaching his subject affected his practice.

General Feedback

General feedback consisted of 11.2% of all feedback to students in P7's observation. General feedback from P7 consisted of acknowledgement of answers and work, using comments such as "okay, yep" and "yeah, you could". Discussing these comments, P7 stated:

> *P7: Erm... just to... an indication to let them know that they are on the right track. Because there are a lot of kids that...need positive reinforcement. To let them know that they are on the right track. You know, there are...if I ignored that and just said okay, I feel that that is vague. I'm not telling them that it is a good answer or a bad answer or anywhere in between.*

P7 expressed in the interview that he used positive reinforcement, which was not always the case in the observation. He stated if he "just said okay" it would be "vague", indicating that what P7 believed and what he practiced was not non-aligned.

Challenge

Challenge feedback appeared frequently across P7's observation, at 15.5% of all feedback. Examples included scaffolding tasks and providing additional questions to students, following incorrect and correct answers, to provide assistance through challenge. Within the interview P7's use of additional questioning, as taken from the observation, was discussed:

> *P7: It's just canon questioning, not just accepting one answer. 'Oh there's my answer and that's good enough'. Now the way that we're developing, and we've done a lot of CPD on it, over the last couple of years. Is not just, one answer, its being able to develop that answer. It's being able to draw a picture, colour it, and turn it into a digital thing and then making it move by creating it into an animation. It's developing it and creating a whole big picture, and it's trying to make them realise as well, not just to settle with one idea. It's a case of, there's so much more that you can do with that. And if you can instil that, process them, and getting them to think, okay I'm happy with this but I can do that. The whole picture starts to flourish. And the idea to flourish as well. So keep on pushing them, to see if they can try and produce something that isn't just mediocre. That is impressive and shows that they've really thought about it.*

Challenge feedback within P7's interview appeared to be reflective of his incremental belief, where development of work and answers were noted as an important aspect of his teaching. Despite P7's expressed beliefs about an incremental approach, within the observation 88.9% of all challenge feedback was incremental, while 11.1% was entity based. Consequently, although P7 expressed a preference for incremental approaches in his teaching, in practice challenge feedback consisted of entity and incremental feedback; although predominately incrementally based.

Strategy Feedback

Strategy feedback was noted 12.9% of all feedback in the observation, including suggestions for successful work (e.g., "make sure these are written down") as well as working on development points (e.g., "remember, you've also got the amps, which have effects – reverb, chorus"). When discussing strategy feedback in the interview, P7 made references to ensuring students were encouraged to "push" individuals, in order to develop answers:

> *P7: Yeah, trying to push them. And making sure they can see the whole picture, rather than just stopping at the first thought. Instead of coming to a T junction, it's a round-about with many different avenues.*

P7 also reflected on his use of grouping strategies. Grouping strategies in P7's practice were referenced as a way to ensure students could work collaboratively on tasks. Successful collaboration was integral within P7's subject (music), as students were required to create pieces of music as a group. As a result of strategising groups in his lesson, P7 attempted to ensure each group was appropriately mixed in order to develop a strong piece of work:

> *P7: That was more for them. Because there are certain kids in there that understand the others are...better musicians than them. So if I chose Duncan Josh and Greg, it would be… potentially the best piece. But also the worst. Because they're the higher ability ones. Ben can sing and play guitar, and Josh can play drums and guitar. Duncan's good on bass and guitar or piano. So I think there would be a power struggle. Use my idea, my ideas better. But if they worked it out and figured whose ideas were best I think they could create brilliant pieces, but I think that their own egos, would stop them progressing.*

Comfort Feedback

Comfort feedback was not observed or discussed with P7, however P7 frequently cited development through challenging students. References to praising students were made frequently, as opposed to comforting students who were struggling – indicating comfort was not a regular feature of P7's feedback.

Motivational language

Motivational language in P7's observation included the use of "com'on, shh" and "right". When discussing the use of motivational language with P7, his attributions for this type of feedback were to ensure students' outcomes were better and to let students know he was aware they were not on task. In addition, he believe he rarely had to use this type feedback (motivational). In the interview it was identified by P7 that the purpose of motivational feedback in the video was to make students aware they were not on task – as noted in the following quote:

> *P7: They know, I'll give them... I'll give them a little bit of give. But if they're continuously talking about wasting, they're wasting time… so 'right com'on' I don't have to tell them that. That many times. But they need to understand that.*
>
> *CR: what type of feedback would you define it as, based on what you've just said?*
>
> *P7: Its feedback to say you're not on task, its well within your ability to finish this, and to collaborate and to plan, and the more in-depth it is. The better the outcome is going to be for them. It's to say, I'm on to you, I can hear them… and it's slightly animalistic in a way. It's kind of like a way, or a warning call to say 'oi, I'm here, I can see you and hear you, and you're not doing the right thing'. So that is that.*

Despite P7's belief, that he rarely used motivational language, it accounted for 47.5% of all feedback in the observation. Consequently, this was another example of where belief and practice did not always align in P7's practice. It was noted, however, that P7 did use motivational language in order to attempt to maintain students' concentration across tasks – as per his attributions in the interview.

Goal Structure

Goal structure was not coded within the observation, or directly referenced within the interview. Although there were features of mastery goal establishment from the tasks set by P7, that emphasised students developing and learning through creative tasks and open ended activities (e.g., creating a piece of music). In the starter activity, for example, P7 provided an open-ended question, which was reflective of a mastery task. Although all students were set the same tasks within their group, to create a narrated soundtrack, the task was not set to demonstrate competence, rather to develop skills for later GCSE projects – thus, mastery based outcomes:

> *P7: So this is the first lesson of a long, long series of lessons for this topic. So I wanted to make sure the planning was there, and everything was in place for us to carry on to the next step.*

Internal and External Factors

When discussing P7's beliefs about external factors affecting practice, he noted environment as a key factor for both his practice and students:

> *P7: I just think that your environment is a very big importance. In that situation. I think if you've got the right environment in school or the right environment at home and your conduct and attitude in school, is, and is good. Then I think you can pick up as much as you want.*

Within P7's practice, he noted the importance of creating the right environment for learning. P7 believed he was responsible for the creation of an environment where students could be encouraged and supported across their academic progression (internal factor).

> *P7: They know, I'll give them... I'll give them a little bit of give. But if they're continuously talking about wasting, they're wasting time. So 'right com'on' I don't have to tell them that. That many times. But they need to understand that.*

Furthermore, P7 identified that creating the right environment for learning was important based on his understanding of students' external factors - which he could not control. For example, he was aware some students had poor social backgrounds and communication from parents was negative. As a result, P7 believed it was his responsibility to feedback in a positive and constructive way:

> *P7: Just for the fact that it's not really solving anything, and a lot of the kids in this school, especially, the only communication that they have with their parents is through shouting. And negativity, in that sort of way. So, taking that out of the situation and helping them understand different points of view - you know, you're not doing the right thing.*

4.11.4 Summary

On the whole, P7 provided more incremental (at 23.3%) than entity feedback (at 3.4%) within his observed lesson. Feedback which was related to theory of intelligence, and not neutral, was therefore bias toward P7's self-reported theory of intelligence, although fluctuation across incremental and entity feedback was observed. P7's incremental beliefs were also apparent across the interview, where he provided examples of challenging students to consider more complex ideas and strategies to assist with development of ideas. He also expressed a strong belief about maintaining a calm working environment, having a positive rapport with students and using humour across lessons – conducive to learning.

When reflecting on some entity instances of feedback from his lesson, P7 noted that these were context specific and related to both the task and knowledge of the pupil. In the entity cases, he expressed it was not his beliefs of intelligence or his students' level intelligence that dictated his practice – rather, his practice was determined by pressures to cover content in the lesson, and progress to the main task, which was more important. Through discussing P7's beliefs, it was apparent that a combination factors affected his practice – with his beliefs about intelligence accounting for one of a multitude of beliefs working in combination.

4.12 Participant Eight (P8)

4.12.1 Questionnaire Data

Participant eight (P8) was a 27 year old, British female, having taught for 5 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collected she was from school 4 (Appendix 9), an inner city faith academy. According to the intelligence belief self-report she identified as mixed theorist at 3.25, with bias toward an entity theory (score of 4 or greater). She had previous engagement with mindset training through INSET in school.

4.12.2 Observational Data

The class observed was a mixed ability GCSE year 10 Dance class. Across the observation P8 displayed neutral feedback most frequently at 66.8%, incremental feedback accounted for 29.8% of all feedback, while entity feedback was lowest of all feedback at 3.4% overall. Comparing observational data to P8's self-reported belief (mixed theorist), feedback within the observation was congruent to the questionnaire, as she displayed entity and incremental feedback. However, her score was bias toward an entity theory, and there were less instances of entity feedback comparatively to incremental.

Table 4.24 P8 Observation: Theory of Intelligence Feedback Frequencies

P8	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***29.8%***	***3.4%***	***66.8%***	***100%***
Frequency	***61***	***7***	***137***	***205***

Of all feedback observed in P8's lesson, motivational language was most frequent at 42.9%. Strategy feedback was second most frequent at 16.1%, followed by praise feedback at 13.7%. There were no observed instances of failure/errors, comfort feedback or goal structure.

Table 4.25 P8 Observation: Categorised Feedback Percentages

P8	**F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentages	0%	1.5%	13.7%	8.8%	17%	16.1%	0%	0%	42.9%	100%
Frequency	0	3	28	18	35	33	0	0	88	205

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

Percentage of incremental, entity and neutral intelligence feedback for each code are presented below (Table 4.26):

Table 4.26 P8 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	0	0	0
Fb-	0	0	100
Fb+	3.6	0	96.4
Fb	0	0	100
C	80	20	0
Sf	97	0	3
Cf	0	0	0
G	0	0	0
ML	0	0	100

Data indicated P8 only provided entity feedback in her use of challenge, at 20% of all challenge feedback. Challenge was the only category where entity feedback was observed. While incremental feedback practices were most frequent when providing strategies, account for 97% of all strategy feedback.

4.12.3 Interview Data

Data in the interview were coded a total of 120 times, across 48 individual codes. Key themes identified in the interview, in relation to the observational framework, are discussed below.

Failure/Error

Within the interview P8 reflected on her use of the "green pen", which was a strategy used to challenge pupils, in response to student failures and errors. Thus, some areas of feedback were applicable to more than one observational interview code, for example strategies and failure/error. Exploring one such instance, P8 responded to failure and error with a strategy to assist learning to promote learning, outlined in the extract below. Here, P8 discusses her use of the green pen in response to failure:

> *P8: So…normally if they do a spelling mistake in their book, we underline it with 'SP' [for spelling]. Then in the margin they have to learn how to spell it. Either find out themselves or they have to write it out three times.*

Notably, P8 identified how she supported her students through their failures/errors – encouraging them to be resilient to failure by finding the answer for themselves, as well as to practice, to develop their ability. P8 further commented that the green pen strategy was also useful to challenge students, particularly if their answers could be developed and expanded. The use of the green pen, which was a whole school approach, reflected an incremental practice – providing opportunities for student resilience building and independence. P8 expressed that although the green pen use was a whole school policy, she believed it was useful because *"*it shows to me what they're doing without added extras and support. I just can see...what they're at in terms of... without any help" – Therefore also indicating alignment of internal and external beliefs regarding teaching practice.

Criticism Feedback

P8 did not provide any criticism feedback within her observation, however she did discuss her beliefs about not using criticism feedback, notably:

> *P8: …Because you're targeting positively rather than negativity. I think it's funny watching back, because I've been making more of an effort not to do that...*

Between the observation and interview P8 had engaged in an INSET session surrounding the use of praise in order to gain students attention who were misbehaving, rather than criticising those misbehaving. She believed that although there were not instances of criticism feedback related to entity/incremental practices in the video observation, she could have been more "positive", and had been making a conscious effort to engage in more positive practices.

Praise Feedback

P8's beliefs surrounding positivity were also discussed in her praise feedback practices. When asked about her use of praise feedback P8 stated that she aimed to provide students with confidence and positivity, whilst also acknowledging the correct answer:

> *P8: It's just giving them confidence and positivity. So letting them know they've produced a piece of work correctly. And it's a high quality, so just making sure you're reassuring them they have done that right and it what you want from them. And it's giving the girls the confidence, because I find with that group they sound very confident in how they speak out, but actually their confidence to put it down on paper isn't there. So we've; had to build their confidence up for the resilience to get it wrong. Erm… they're a great group, but they do lack confidence and I think that's why it's important to give them as much positive praise as possible.*

Furthermore, P8 identified that her praise practises were different with the group observed, as they were more confident with verbal answers as opposed to their written answers. Therefore, building students' confidence, through positively praising, was an important factor in P8's teaching, in the class observed. P8's comments in the interview suggested individual classes received different types of feedback, dependent on their needs – thus, class grouping were an external factor guiding her practice.

General Feedback

P8 felt as though her praise, for the most part, was very general – giving one word answers; for example:

> *P8: And if I… was more... specific with my feedback they'd zone in on what others are saying. Maybe they'd be more 'miss what did she say there'. It highlights the importance of that answer. And I've been more specific...So I just say brilliant, well done and move on, but by being more specific and saying 'well done for working on that answer Jasmine' then it makes more sense… But my praise can be very general.*

She reflected on her teaching, and noted that she would frequently move on, rather than identify where a student had worked hard. Thus, within the interview, it was evident that P8 wanted to attempt to be more incremental in her teaching approach – and strived for this, however, she believed she needed to work harder and "break habits" to do so.

Challenge

Challenge across the interview and observation were frequent. P8 identified where she successfully challenged students, and ensured students were questioned to develop answers. For example using the 'right is right' teaching strategy:

> *P8: We did a lot of work on 'right is right' so you never really accept the answer first answer. You go to… you could ask someone else, and give them thinking time.*

Despite some clear examples of additional challenge across questioning, there were instances where P8 gave students the answers, coded as entity feedback. Reflecting on this, P8 noted:

> *P8: I was more conscious of time. For easiness I just gave it her. To save time. Rather than say ask a friend or google it. Rather than having that fights. I find a lot of the girls aren't reliant and don't want to get things wrong. Yes. Probably what we should be doing is building that up. But I think I find that…it's sometimes easier. Rather than having that fight, because …we've not got time to waste. I think, I probably did over plan, in terms of research and market place. It was all quite a busy lesson. So I Was conscious I just wanted to get on.*

P8 identified that continuously challenging students would be exemplar teaching, however time did not always allow her to do so. Therefore, she noted time was a hindrance to her teaching practice. Overall, P8 challenged students predominately through incremental feedback, whilst also engaging in entity practices – reflective of her mixed theorist beliefs of intelligence.

Strategy Feedback

As previously discussed, much of P8's strategy feedback was interwoven with other observation coded areas – for example challenge and failures/errors. A specific strategy implemented by P8 was the use of class discussion:

> *P8: So if I open up a discussion with the class… I'm… checking understanding first, before. Do we have opportunities to discussion and apply first, before an exam question. So I would open a discussion with the class or a group, so I know they're happy – so they've got the confidence to put that into practice.*

According to P8, discussion was a useful strategy for both student learning and P8's teaching, as she was able to ensure students were confident and happy with putting answers into practice. This is a further example of her incremental practice, to develop confidence and identify future application of answers.

Comfort Feedback

Comfort feedback was not observed or discussed within P8's lesson or interview.

Motivational language

Motivational language was observed most frequently within the observation at 42.9% - all of which was neutral. When discussing motivation language with P8 she stated:

> *P8: That's just my classroom management and making sure everyone is focused, and what I'm doing…yeah, so they are focused on what I'm doing and they know and stay on the task.*
>
> *P8: So that motivating to make sure they are focused… but that motivation can be coming from them, rather than having to motivate them always.*
>
> *CR: So the ultimate goal is motivation?*
>
> *P8: Yeah – to learn and listen to you. And that's what they're there to do.*

From this excerpt, P8 suggested her motivational language was aimed at students to ensure they were focused, as well as creating students' own self-motivation. Ultimately her small, and frequent, reminders were to ensure listening and students staying on task.

Goal Structure

P8 did not discuss goal structure within her observation, or display any instances of goal structure in the observation.

Internal and External Factors

P8's interview revealed she was keen to develop student knowledge, and encourage confidence development. Furthermore, P8 engaged in reflection on various areas and identified where she would teach differently. She noted this was in response to using STR in the interview, as well as from additional INSET training she had engaged with since the observation recording. For example:

> *P8: We also looked at…pause pounce bounce. That's a good strategy as well, that we've worked on in CPD.*

P8 identified that external factors, such as CPD, affected her teaching strategies positively, as she could highlight benefits in the classroom from applying what she had learned. Strategies on the whole, such as probing students for answers, were also reflective of an incremental theory, used by P8 to challenge pupils across the observation, as previously discussed.

Another external factor which supported P8's teaching was the size of the class, within the observation. P8 noted:

> *P8: Because you've got a small group with this class… what would maybe be seen as shouting out with other classes, the small group, we can have that. They are a bit older, they are y10. But they are respectful of each other, it's more because I've opened it to the group and its okay to do that. So I've allowed them to have that, it's quite a relaxed approach to teaching… but it works.*

P8 identified that class size and student attitude affected her teaching, as students were provided with opportunities to shout out, but were respectful of each other when doing so, and therefore able to progress learning in this way. P8 suggested that her approach in the observed lesson was more "relaxed" than usual, insinuating that in some lessons she taught differently. Thus, highlighting the role of class size and individual students in affecting her approaches to teaching.

Time was, however, noted a hindrance to P8's practice. When reflecting on an instance where she displayed entity practice (e.g., giving the student an answer to a spelling) she identified that a lack of time caused her to feedback in this way:

> *P8: However then, because I was more conscious of time. For easiness I just gave it her. To save time.*

P8 wanted the class to "move on" together, which was important to the learning of all, as opposed to challenging the individual in this case. This instance indicated it was not always possible for P8 to enact incremental teaching practices, as time constraints did not allow and hindered her teaching approach. There were other instances where P8 did challenge pupils incrementally, when time permitted.

An additional factor that was identified as both a hindrance and support to P8 was student attitude and "mindset". P8 stated:

> *P8: They need to have that growth mindset [pupils] as much as teachers need to have a growth mindset. And if you can be a model and have growth mindset, I think then you can be a model and teacher pupils to have that same attitude.*

The excerpt above highlights P8's internal belief about mindset, and the role of teachers in modelling the correct mindset. Therefore, despite contradictions in teaching practices – as a result of time constraints, P8 expressed her strong beliefs about teachers modelling behaviour and feedback for students to learn from.

4.12.4 Summary

To summarise, P8 expressed multiple beliefs about her approach to teaching, although emphasised on various occasions that she was concerned with confidence development. P8 provided most neutral feedback, in accordance with her mixed theory self-report. However, P8's feedback comparatively between incremental and entity, was most frequently incremental at 29.8%. While entity feedback only accounted for 3.4% of all feedback. Comparing incremental and entity feedback alone, does not align with P8's bias toward her self-reported entity belief (3.25).

4.13 Participant Nine (P9)

4.13.1 Questionnaire Data

Participant nine (P9) was a 34 year old British female, having taught for 9 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 5 (Appendix 9), a mixed gender academy. According to the intelligence belief self-report she identified as a mixed theorist, scoring 3.25 overall, however bias toward an entity theory of intelligence (4 and above). She had no previous engagement with mindset training through INSET or own research.

4.13.2 Observational Data

The class observed was a mixed ability year 11 GCSE Religious Studies (RS) class. Across the observation, P9 displayed neutral feedback most frequently, out of all feedback at 73.4%. Incremental feedback was coded at 21.4%, while entity feedback consisted of 5.2% of all intelligence feedback. Overall, P9's intelligence feedback was predominately neutral, with some instances of incremental feedback and low uses of entity feedback. Results from the observation therefore indicated P9 displayed both incremental and entity feedback. Consequently, her self-reported belief (mixed) was enacted in practice, although feedback was bias toward incremental theory of intelligence at 21.4%, despite her self-report score leaning toward an entity theory (self-report 3.25).

Table 4.27 P9 Observation: Theory of Intelligence Feedback Frequencies

P9	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***21.4%***	***5.2%***	***73.4%***	***100***
Frequency	37	9	127	***173***

Of all feedback categories across the observation, motivational language was most frequent (45.7%), followed by challenge feedback (15.5%) and strategy and praise feedback (both at 12.9%). There were no observed instances of comfort feedback, goal structure or feedback criticism.

Table 4.28 P9 Observation: Categorised Feedback Frequencies & Overall Percent

P9	*F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	4%	0.6%	26.6%	32.4%	22%	1.7%	0%	0.6%	12.1%	100%
Frequency	7	1	46	56	38	3	0	1	21	173

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

The breakdown for each code in relation to incremental, entity and neutral intelligence feedback is presented below. The results highlight high entity feedback in response to failure/error (42.9%), as well as high incremental feedback in the areas of challenge (84.1%), strategy (100%) and goal structure feedback (100%):

Table 4.29 P9 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	14.2	42.9	42.9
Fb-	0	0	100
Fb+	0	0	100
Fb	0	0	100
C	84.1	15.9	0
Sf	100	0	0
Cf	0	0	0
G	100	0	0
ML	0	0	100

4.13.3 Interview Data

When coding the interview, 120 codes were referenced in total, across 57 individual codes.

Failure/Error

P9 responded to students' failures/errors a total of 7 times across the video recorded observation. Failure and error were discussed at various points across the interview, however also linked to other codes – see criticism feedback, challenge feedback and strategy feedback in this section for excerpts and discussion.

Criticism Feedback

When discussing P9's use of criticism, she was asked to reflect on an instance where she had told a pupil they were a "clown" – an example of personal criticism in light of a mistake (also links to failure/error code). This instance was in response to a task set the previous week, where a student had not completed the task correctly, as discussed below:

> *P9: So this sheet, last week they were handed out and I made a point of saying, at the top it says name. Do no write your name, put the name of the prophet and then I handed it out and said 'tell them not to write their name'. And I said there'll be some clown in here, joking, who will write it. And they all remembered apart from him. It was actually Luca who did it, so we'd already laughed at him.*

P9 noted that they were joking, and that the student would know this, therefore, she believed criticising was not detrimental to students' intelligence beliefs, in this instance. Furthermore P9 attributed her behaviour to her relationship and rapport with the student, resulting in P9 being able to make criticism comments:

> *P9: …I know them and they know me... And I genuinely believe they know that I like them...*

Consequently, although this type of negative language is associated with an entity practice (e.g., insinuating a student lacks intelligence) P9 identified that situational factors, such as class, teacher-student relationships and knowing individuals, resulted in students being aware of the nature of such comments. Therefore, an internal factor which affected her use of intelligence feedback.

Praise Feedback

Praise was observed on 46 occasions in the observation, with all of these instances neutral, for example “well done”, “good”, “brilliant” and “excellent”. There were no instances of incremental praise feedback. Discussing praise feedback with P9 she noted:

> *P9: Yeah I think I praise often. I hope that I do. When I did my training a long time ago I remember one of the things was I had to stagger my praise because I would give such enthusiastic praise. Because they’d give me one an alright answer and I would say it was brilliant and it meant that I couldn’t say another answer was brilliant. Being told... stagger your praise. If someone gives you an outstanding answer… But I don’t know if I ever listened to that. I tried to. But I don’t know if I watched back that lesson, I’d think oh that was really boring. It’s possible to be to do with who gives me the answer as well. So if there’s somebody who doesn’t speak much, like if he did it…id be in raptures about it. Because he doesn’t talk.*

P9 identified two areas within the interview. First, she discussed drawing on her training, which she believed in some instances may have determined her feedback. However, she also noted that she would need to reflect and she was unsure whether comments on her praise practices were enacted. Secondly, P9 identified that she may have praised students differently, depending on what she knew of them - taking a student centred approach to her praise practice. Overall P9’s feedback in the observation was not bias toward an intelligence theory, however interview comments suggested her feedback was student centred and dependant on who answered.

General Feedback

General feedback was observed 56 times across the video recorded lesson, this included P9 acknowledging answers from students, although not providing praise. General feedback linked to the praise feedback when reflecting, where P9 noted “it’s possibly to do with who gives me the answer as well*”.* Therefore, some general praise may have been in response to students providing answers that would be expected, resulting in acknowledgement, rather than praise feedback.

Challenge

Challenge feedback was observed most frequently in relation to incremental feedback, at a frequency of 32 times (84.1%). P9 regularly challenged student answers and required them to expand or answer additional, more difficult, questions. When asked about why she continuously questioned and challenged pupils, P9 stated:

> *P9: I don't know... erm...I think probably to give them. The whole point is they are studying the religion and I've only get a year to teach them Islam. Which is one, as you will know, I really want them to get, because…I tell them when I got to choose, I chose Christianity because it's one of the easiest ones and Islam. And I ask them why I chose Islam, and they all tell me because of the terrorism thing. So possible, it's because I want them to really get to grips with this. Maybe… asking further questions can then… Going from Ibrahim to haji. Because there will be a link in the exam. But that's why it's so important, just to get it into their head how big this religion is. It's the fastest growing one…If all Muslims were terrorists, you'd be dead. So, possibly because of that? I don't know.*

From P9's answer, it was clear that there were multiple reasons for her behaviour, for example ensuring students were aware of content in the time constraints (e.g., one year to attain a GCSE for Religious Studies, as opposed to 2 for other GCSE subjects). P9 also held strong views about educating students about Islam for a better understanding of wider society and being able to challenge discrimination and prejudice. Educating students for wider society was a common theme across P9's interview, as discussed in internal and external factors of this Section (4.13).

Although incremental challenge feedback was observed frequently, entity challenge feedback was also observed, 6 times across the lesson (15.9%). An instance of entity challenge feedback was discussed in the interview, when P9 had provided a student with the answer:

> *CR: And it's quite funny that the word is determined. Do you think he would have been able to spell it if he tried?*
>
> *P9: Yeah. He could spell determined, it's not a hard word… he doesn't have any... he's not dyslexic. He doesn't have any issues… I would've just said de-ter-mined and he would've got it, he would've spelt it. In-fact she probably does that...*

In this example, P9 had chosen to allow another pupil (Louise) to provide the answer to a spelling. P9 noted that the student who could not spell the answer would have got it, because it is "not a hard word" and they didn't have any "issues". When asked why P9 allowed the student (Louise) to provide the answer she stated:

> *P9: [Laughs] I don't know! I probably didn't want to speak to him and she's good at spelling?*
>
> *[Plays video]*
>
> *P9: That's why! Because someone gives me the answer determined, and I say well done [to another student], and Louise says 'that was me who gave the answer'. So I gave someone else the credit, and she gets face on. So then she's allowed to give him that.*

Initially P9 suggested, with humour, that her feedback may have been as a result of not wanting to speak to the pupil asking for assistance. However, upon video reflection, P9 noted that she allowed Louise to give the answer as P9 had failed to acknowledge her for providing the correct answer - insinuating praise and intelligence to Louise through allowing her to assist another pupil, while failing to challenge the pupil asking for assistance.

Strategy Feedback

Strategy feedback was observed across P9's lesson a total of 3 times, all of which were incremental (e.g., providing strategies for students to progress in learning). An example which was used for STR with P9 was the breaking down of a keyword, discussing this P9 stated:

> *P9: Well I like to do that [break down], because then they remember the word. So they know now that any 'omi' word means 'all'. So we always use omnivore because they know it from science and then they're like 'oh yeah ALL'. Sometimes they know the omnibus, on hollyoaks on a Sunday… omi, all. So omniscience, omnipotent beliefs can fit in with beliefs about god and beliefs about Allah.*
>
> *CR: Yeah so again, it's a strategy for breaking it down?*
>
> *P9: Yeah and possibly remembering it because 'carnate' 'incarnate' 'carnivore' 'flesh' they get flesh. And they remember in the flesh.*

By providing this strategy and linking the word to other areas of the curriculum, P9 believed students were more likely to remember it, which would be useful for applying keywords in the exam. Further to her use of strategies, P9 linked her own beliefs about the wider purpose of remembering key information, such as words. She noted:

P9: 100% I want them to know about the religion. I want them to be informed. I tell them all the time, I want you to be able to tell those people in the pub, who tell you 'all Islam's are terrorists' why they're wrong. Obviously, I want them to pass the exam, it makes me look good and them feel good… But I want them to understand this.

Consequently, P9's strategy feedback was two-fold, providing understanding for the purpose of examination and understanding, as well as challenging student misconceptions about the religion.

Comfort Feedback

Comfort feedback was not observed in P9's lesson or discussed in the interview.

Motivational language

There were 21 instances of motivational language within the observation. Reflecting on some of these, using STR, P9 stated:

P9: I want them to not talk over what I'm doing. There's maybe a keyword, or something they need to see. So I don't want to lose them. I don't want them to be…involved in their own conversations. I still want the focus on me.

CR: So, it's all about getting them to focus on the task in hand?

P9: Yeah

P9 stressed that the use of her ML was to ensure students were staying focused, and ensuring that they were on task for learning; thus using motivational language to ensure this was achieved.

Goal Structure

Goal structure was referenced once in P9's observation, incrementally, where she informed the students what they would be learning the following week (e.g., mastery goal). GS within P9's lesson linked learning between lessons, and therefore was incremental in the observation. However, upon reflection P9 did also suggest her GS set up was as a result of not having an additional task:

CR: So at this point you tell them what they're going to be doing next week. So I was wondering why, it was important to let them know?

P9: Possibly so they can see. So Abrahiam and Muhammad. So how they can see how as prophet they are important. But also because they are packing away, and I'm trying to keep them focused. And it's a strategy.

CR: So for crowd control but also for next lesson?

P9: Yeah, they know he's a Jewish prophet, so how it links.

In this instance, GS was both a strategy for behaviour and focus as well as ensuring the students were aware of links between continued learning across lessons.

Internal and External Factors

External factors affecting P9's behaviour were referenced on numerous occasions across the interview; particularly surrounding her beliefs about student intelligence, the school demographic and pupil social background. When commenting on student intelligence, P9 noted that at times she believed parents and pupils intelligence were genetically linked:

> *P9: No, I don't think there's a hard and fast rule there. Some kids… there are some who struggle academically, and when you meet their parents or see their parents you think okay that's genetically linked. I think generally speaking if you are very thick, you may have a thick child… but you don't have to.*

Although P9 suggested in this statement that she held an entity theory of intelligence (e.g., thick or clever), she also noted, that intelligence is background specific. For example, discussing pupil premium students (from low income families) P9 stated:

> *P9: But then you get into back ground, I've got some very intelligence pupil premium kids who don't ever know the news, or get it at home, because it's not on. So I don't know really...*

Social background and demographic were further explored in the interview, where P9 suggested that the majority of students she taught were from working class backgrounds, therefore ignorant to wider society. P9 expressed strong beliefs about external factors, which affected her beliefs and practice – by challenging pupil beliefs and making pupils accountable:

> *P9: Yeah you've got your middle class daily mail readers, white working class, who will again will not get much of the guardian or liberal news… so you're fighting that as well. And in a way, I will say that ' a lot of uneducated people will tell you this' and I'll give them a daily mail headline. Or something like that. Just so they know! [laughs] I've done it before, when we talk about islamophobia, I've put it up… things as if they are headlines. And said 'where have I got this from?'. And then eventually I'll say 'this is what you had said in my lesson'. And then they're like…or some of them at some point will be like 'I said that....' and I say, yes, you did. And you said Muslims control their women, that's not a headline.*

In addition, other internal factors included developing confidence as well as ensuring students achieved the best possible result on exams. P9 also expressed strong internal beliefs about parents as external hindrances to her role, as she was contending with parental value of RS as a subject:

> *CR: You're teaching approach and your beliefs about that are, although you know you have to be here to get them their result, its either secondary or on a part that you want to develop their confidence to just…know what they're talking about and have the sense of belief in themselves?*
>
> *P9: Yeah, all of that. And I want us to enjoy our time together. And I like it better, and I do genuinely think it's important. Because they come to it with this idea of 'fucking religious studies' and the problem is with the same. But if you change it parents get upset and say that's not a real subject. So, you're stuck. It is very much; you don't have to do this in history. They're never going to meet a plague victim. You don't have the same' why do I have to do this'. So the fact that none of them do that is a real bonus in some sense.*

4.13.4 Summary

In summary, P9 enacted a multitude of incremental (21.4%) and entity (5.2%) beliefs, as expected according to her mixed theory of intelligence (3.25). Despite this, her feedback in practice was more reflective of incremental beliefs, which was not expected – given P9's self-reported bias toward an entity theory of intelligence. Again, in the interview, P9 expressed both beliefs, although suggested at times that intelligence was fixed. P9s beliefs were, for the most part, reflective of an incremental theorist in that she was concerned with increasing students social intelligence – in order to ensure students were equip to challenge prejudice and discrimination.

4.14 Participant Ten (P10)

4.14.1 Questionnaire Data

Participant ten (P10) was a 28 year old British female, having taught for 6 years in total (excluding any teacher training, e.g., Post-Graduate Certificate of Education). At the time of data collection she was from school 4 (Appendix 9), a mixed gender Church of England school. According to the intelligence belief self-report she identified as a mixed theorist, scoring 3.25 overall, however bias toward an entity theory of intelligence (4 and above). She had no previous engagement with mindset training, however was aware of research surrounding mindset.

4.14.2 Observational Data

The class observed was a mixed ability year 10 GCSE Dance Theory class. Across the observation, P10 displayed neutral feedback most frequently at 86%. Incremental feedback was coded at 11.5%, with entity feedback at 2.5% of all intelligence feedback. On the whole, P10's intelligence feedback was predominately neutral, with instances of incremental and entity feedback. Consequently, her self-reported belief (mixed) was enacted in practice, although feedback was bias toward an incremental theory of intelligence at 11.5%, despite her self-report score leaning toward an entity theory (self-report 3.25).

Table 4.30 P10 Observation: Theory of Intelligence Feedback Frequencies

P10	*Incremental*	*Entity*	*Neutral*	*TOTAL*
Percentage	***11.5%***	***2.5%***	***86%***	***100***
Frequency	14	3	104	***121***

Of all feedback categories across the observation, motivational language was most frequent (45.7%), followed by challenge feedback (15.5%) and strategy and praise feedback (both at 12.9%). There were no observed instances of comfort feedback, goal structure or feedback criticism.

Table 4.31 P10 Observation: Categorised Feedback Frequencies & Overall Percent

P10	*F/E*	*Fb-*	*Fb+*	*Fb*	*C*	*Sf*	*Cf*	*G*	*ML*	*Total*
Percentage	0.8%	5%	9%	36.4%	10.8%	5%	0%	0%	33%	100%
Frequency	1	6	11	44	13	6	0	0	40	121

**Failure/Error (F/E), Feedback Criticism (Fb-), Feedback Praise (Fb+), Neutral Feedback (Fb), Challenge (C), Strategy Feedback (Sf), Comfort Feedback (Cf), Goal Structure (G), Motivational Language (ML)*

The breakdown for each code in relation to incremental, entity and neutral intelligence feedback is presented below. The results highlight neutral feedback across 5 codes (F/E 100%, Fb- 100%, Fb+ 100%, Fb 100% and ML 100%). While incremental feedback was observed in SF (61.5%) and C (100%). Entity feedback were only observed in one code, C, at 23%. Thus, entity feedback was observed least frequently of all feedback. Given high uses of neutral feedback, it could be argued that P10 enacted predominately in line with her mixed belief, as self-reported. However, as there were higher uses of incremental feedback, comparatively to entity, there were some misalignment between her self-report and practice.

Table 4.32 P10 Observation: Theory of Intelligence Catagorised Feedback Percentages

	Inc	*Ent*	*Neu*
F/E	0	0	100
Fb-	0	0	100
Fb+	0	0	100
Fb	0	0	100
C	61.5	23	15.5
Sf	100	0	0
Cf	0	0	0
G	0	0	0
ML	0	0	100

4.14.3 Interview Data

When coding the interview, 144 codes were referenced in total, across 55 individual codes.

Failure/Error

Within the observation failure/error feedback were noted once, however, in the interview P10 noted instances where she had challenged students based on their failure. Therefore failure/error feedback was also interwoven with other aspects of learning. For example:

> *CR: So, was that her answer or are you providing the answer and you're telling her…*
>
> *P10: I think she'd written the answer, but her structure was the wrong way. So previously, when I briefly mentioned to Amy, I said where does the costume link. I think that's a confidence driver, so Amy had already identified in her answer. I think you could argue they're doing this as a test, there should be no feedback...*

P10 noted in the interview here that she was responding to a student incorrect structure. Reflecting on the observation, P10 noted that at times, responses to failures were deliberated in relation to the student. Particularly, failure and error was important to P10, as she was attempting to instil confidence in her students, which affected her use of feedback (see internal and external factors).

Criticism Feedback

Criticism was observed on 6 occasions within the observation, all of these instances were neutral, for example P10 stating "wrong" or "incorrect". This was discussed in the interview, where P10, again, noted that her feedback was dependant on the student:

CR: So there were a couple of times where they got them wrong as well, and you said to them incorrect. I was wondering, you are looking at right or wrong…erm… does stuff like that, does it bother them, or are they more appreciative of the fact that you're like 'that's incorrect' so they need to work on it?

P10: I don't know…erm… I think it depends on what kid it is. So lady, who asked that question…so, I could say to her, and she'd be okay with it. And be like 'well what's the right one then'. But then, Bella, who came in late. A, she wouldn't read her answer out and…if she did I might say 'it's not quite right'. I'd change my phrasing, because I know that lady has… belief in herself and is able to take the criticism. And go 'ah okay'. I think it's also a speed thing, when you're trying to get through and group mark it.

Criticism in P10's feedback was not followed by any other instruction which linked to entity or incremental feedback (e.g., that's wrong, you need to put in more effort). However, according to P10, neutral criticism feedback were as result of not having enough time, indicating time also affected her feedback in the observed instances.

Praise Feedback

Within the observation P10 reflected on her use of praise and beliefs about praise, on many occasions. According to P10, use of praise was reflective of her expectations of individual students, as well as used to motivate and encourage students, as discussed below:

P10: Yeah, it might be… I guess so, if someone comes out with an answer you wouldn't necessarily expect them to come out with and it's a bit like a shock. And, actually that's really, really good, well done. Yeah, so that's a reason why I'd use language like that. Erm… but again, it's just a motivation thing, and an encouragement thing. So 'yeah well done, and remember that you've done well, so next time....'. My hope is the next time we do a summative, there will be less questions asked. Because they're already success on one, hopefully they'll trust in themselves.

P10 further commented on the motivational aspect of praise, in an attempt to instil student's self-belief to work autonomously:

P10: We have to encourage and to praise and to motivate. To want to do well and believe in themselves, and that they can do well. So I think that's a massive part of it. But at the same time we have to tie that in with the sort of…harsh of ourselves, saying to them you have to work at it. You have to be independent… But I guess that's why the praise is so much. You know, keep going, trust in yourself.

Praise was also used by P10 to create trust between herself and her students. This was a key aspect of P10's teaching as she noted that the students in the observed class lacked confidence and trust in their abilities. This was combined with student's inability to deal with the pressure experienced under exams, where P10 noted students struggled. Consequently, she expressed a belief that students could overcome this if praised appropriately across tasks:

> *P10: I like channelling them both, by forcing them to do independent work, but by praising them for doing it. You then hopefully end up with a student who can sit in an exam and think, I trust in my own ability. I can do this. That's always what's in my head. When I think about that group. They'll sit their mock in June this year. And at least 6 of them will have some form of breakdown about it. They'll cry either going on their way in or cry on the way out or cry when they've marked it, because they want to well. Everyone wants to do well. But they just lack that ability sometimes to…conquer pressure.*

General Feedback

When discussing general feedback, observed most frequently at 44 times, P10 noted that the lesson observed was a continuation of the previous lesson – where students had been working on exam answers. Following the practice exam, P10 and her students marked work, where there were many instances of general feedback. Across these, P10 acknowledge answers through "yes", "correct" and "okay" – however, did not elaborate in the lesson. When discussing general feedback, P10 cited the nature of the lesson, as well as simple acknowledgement, which resulted in pupils continuing to work:

> *P10: Kate, in particular, she'll say 'come and read this'. And in the lesson, the one you watched the video, the previous lesson we ran out of time – so they had 20 minutes in this lesson to finish it off. So, we went through it. And she got a grade 9 on that assessment. And that's the highest grade she could've got – she still lost marks, but still she got a 9. But yet, she'll write a paragraph and she'll say 'will you just read it', and then she'll go and write 2 more for you, but it's just that acknowledgement that you're on the right lines.*

Such acknowledgements, were a way for P10 to motivate students to work, informing them they were working towards correct answers. Thus, general feedback within P10's observation was also useful for providing additional motivation.

Challenge

When discussing P10's use of challenge, she cited using the green pen strategy to challenge (see Strategy Feedback Section). P10 noted this as a specific strategy to ensure students were challenged across their learning:

P10: Yeah we went through it and marked it in green. Then I remarked it in purple, including their 12 marker, and then you give them a success and a challenge. Then they do the challenge in green.

There were also instances of entity feedback in the observation, when challenging. For example, giving students the answers to questions. The nature of the lesson, exam marking, however was cited as a reason for entity feedback.

Strategy Feedback

Linking to challenge, the green pen strategy was a whole school initiative, used as a strategy to challenge students, as discussed:

P10: Yeah, it's been something that's been embedded over the last couple of years as a whole school. And at first the children they were really worried, because it was a bit 'oh green pen, I don't want to put green pen in my book. Erm... it does work fairly well. You're supposed to use it through active assessment as well. So what I should be doing is as they're doing work in their book, as their answer questions, I should be going round and reading what they're doing over their shoulder. Or taking their book off them to read it, and then noting down, have you thought about this, have you thought about that

Through the use of this strategy, students were continuously challenged across lesson, as well as in response to previous work, which had been teacher marked. This was useful to P10, as she could ensure students were challenge, although she also noted that it was not always helpful or possible in learning because of class size. Reasons for this are further noted in internal and external factors, class size.

An additional strategy used by P10 was the use of “hands”. By using harsher boundaries students were forced to be independent learners, and think for themselves. The development of independent and confident learners was noted as a key theme across P10's interview, and her approach to developing these was particularly incremental, as appropriate scaffolding was put into practice:

P10: And they find it occasionally, would you like a no hands up session. You're not allowed to put your hand up once. And then they, really struggle… I think sometimes you need to push those harsher boundaries in place, because they won't become independent learners. I'm not sat next to them in the exam…

Comfort Feedback

Comfort feedback was not observed in P10's lesson or discussed in the interview.

Motivational language

Motivational language was observed second most frequent within the video recorded observation, on 40 occasions. The use of motivational language was key to P10's practice, as she noted the purpose was to maintain attention, and ensure they were on topic across different tasks:

> *P10: To keep their pace and focus. So, if you're stood at the front and directing and teaching, I've got all of their attention. But If I spend time with a singular member all of a sudden Katie will be having a full-on conversation and I will know she's still got a 12mark question to do. Because she's still finding every distraction. So, the reason for that is so I can say to her I can see that you're off topic, and I can see that you're not on topic, I know you need to do it, and you know you need to do it. So, it's more of a behavioural strategy.*

Motivational language was also key to behaviour management, in an attempt to be neutral but also ensure students stayed on task. As discussed below:

> *CR: So, a prompt for behaviour management, which in turn will then result in them doing work?*
>
> *P10: Yeah and it's a prompt of I'm not being too negative I'm not going to shout at you, but I'm aware that you're not doing your work. Therefore, I'm making you aware that I'm aware.*

Goal Structure

Goal structure was not referenced in the interview, nor observed.

Internal and External Factors

P10 expressed many views within the interview about internal and external factors which affect her practice. For instance, when reflecting on the positive green pen strategy, P10 also noted how it can hinder learning and progress, dependant on class size and tasks:

> *P10: But the problem that I've found is that sometimes your class size is too big and you can't get around them all. And other times you don't want to disrupt their writing. I don't want to be like 'oh let me just put my purple pen in... .' so general it's done retrospectively, because it stops the flow. So like, generally, it's done as an opportunity to apply. Which is an exam based question. And I'll purple pen it, during whatever free time, then in the following lesson they'll respond in green. But any work they do in green, should be an improvement of what they've missed out on previously.*

Thus, P10 enacted in accordance with her personal beliefs, and dismissed the whole school policy, in an attempt to ensure learning and progress were made in the lesson.

Reflecting on her beliefs about confidence development, P10 noted that although useful, it also created more work for her. Students with less confidence required additional probing, and feedback, which, again, hindered P10's teaching:

> *P10: Ability wise, as I said, really quite mixed. The higher ability are quite high ability, you know, they can answer higher order questions. They can apply their knowledge quite well. But lack confidence in doing that, and need prodding and probing. The amount of times they say, 'will you just read this paragraph' and you read it and say 'yeah, you're absolutely right – so stop wasting your time, asking me, when you should be doing. Just keep going!'*

Confidence development also linked to P10's beliefs about the importance of soft skills, and thus the many roles as a teacher:

> *P10: Yeah all of the soft skills that go into it. That are going to form, hopefully the rest of their lives as well. So you're teaching them how to process information, regurgitate information, apply information, but then do all that with confidence and all on their own.*

Despite some hindrances, continued professional development (CPD) in school was identified by P10 as a support in her teaching. CPD resulted in P10 considering additional ways to challenge students through the use of strategies:

> *P10: And I guess, I've been trailing some metacognitive strategies, with that group. Not necessarily in that lesson, but with that groups. So, it's all about thinking about the process that you're going through and thinking about the knowledge you already have and how you can apply that. And I know its higher ability students, or those that are more intelligent, are able to do that. They're able to answer these three probing questions. So the question might make you consider, what knowledge you have that you need to apply to this situation. Or what does a good one (answer) look like, how do you apply. It's like Kenndey, she got 12 out of 12.*

Two additional hindrances to P10's role were KS2 data, and the affect this had on additional pressure from senior leaders, when reviewing student work. KS2 data, for P10, had an effect on students predicted grades, as discussed below:

> *P10: … another thing you don't know is that when they're in KS2 doing their sats, how much help did they get from any TAs. And we see that quite a lot. Where some students come in with really high KS2 data, and we're like 'no' – how is that even possible? So, we talk to the student, and say 'did you gave anyone help you whilst you were in primary school?'. And they're say 'oh yeah, such and such was helping me' and they think – well, that sways it then.*

> *Because they have high targets and that's not relevant to their ability necessarily.*

Consequently, there were high expectations for some students, which hindered her role as a teacher, as she was expected to reach and maintain unrealistic targets. Reflecting on this, P10 noted:

> *P10: Yeah, and you sort of have…to answer to your superiors. So, there's a girl in there called Cathy, she's the one that dances on the video – which would deem her intelligent. She's bright, it's the equivalent of a B, you know, that's really good. But really, she's working at grade 4. So, she requires a lot more scaffolding, then you take her book to a book meeting and they go, why is she getting scaffolding when she's a grade 7?! She's not though.*

P10 suggested that she was required to justify her students' results, which was both a frustration and hindrance, as an unrealistic reflection on her teaching.

4.14.4 Summary

Across P10's interview a number of key areas were discussed, notably P10's focus on developing independent learners and instilling confidence, in an attempt to improve learning. P10 displayed most incremental feedback in her use of challenged, whilst entity feedback was noted most frequently, and only, in challenge feedback also. The majority of P10's feedback was neutral, which was partly reflective of her mixed-belief (3.25), with an entity bias.

Further to the interview, P10 identified many internal and external factors which affected her practice, including the role of class size, KS2 data and developing additional skills. P10's practice was, at times, reflective of her mixed belief – bias toward an entity theory. Within her interview, she expressed opinions which were both entity and incremental, although discussed more instances of developing student life skills for future learning and the ability to work independently.

4.15 Chapter Summary

Summarising Chapter 4, data presented above highlights individual teacher data, collected through self-reports, video recordings and interviews. The overview of individual data is useful in providing the reader with insights into individuals' before collating data to answer the three research questions (Section 1.2). Chapter 5, which follows, presents all teacher data, while providing evidence from Chapter 4 to underpin findings.

Chapter 5

Findings and Discussion

Introduction

The following Chapter explores data in relation to the research questions (Section 1.2), as well as drawing upon key literature presented in Chapter 2. The aim of Chapter 5 is to compile individual data from Chapter 4 and present findings, in light of analysis. Sections 5.1 – 5.3 answer the individual research questions presented in Section 1.2, while Section 5.4 links findings from this Doctoral thesis to other studies, identified in Chapter 2.

To reiterate from previous Chapters (1, 2 and 3), research indicates teachers' socialise theories of intelligence through various feedback practices (see Sections 2.4, 3.10 & 3.11). Teacher incremental intelligence feedback implies malleable intelligence and promotes students' increasing their intelligence through hard work and persistence, notably when faced with challenge (e.g., "you have to work at this") (Dweck et al., 2017; Haimovitz & Dweck, 2017). While entity feedback implies students possess fixed intelligence and therefore includes feedback which reflects this (e.g., "you're slow – hurry up") (Rissanen et al., 2019; Song, 2018) (see Sections 3.10 and 3.11). Neutral feedback, rather, is disassociated with an entity or incremental theory of intelligence; although may insinuate positive or negative valence (e.g., "well done", "good", "okay") (see Section 1.1.3).

5.1 RQ1. Do teachers' theories of intelligence correspond with their intelligence feedback; if so in what ways?

RQ1 aimed to add to current, but limited, research which indicates teacher intelligence feedback and teacher intelligence belief are non-aligned and nuanced (Foliano et al., 2019; Haimovitz & Dweck, 2017; Rissanen et al., 2019; Song, 2018; Zhang et al., 2017). Furthermore, research which does exist was undertaken in the US, China and Finland. There is also a focus on Primary Schools in England, where some interventional studies have been implemented (Rienzo et al., 2012; Foliano et al., 2019). Therefore, an additional aim of RQ1, was to make a unique contribution to the literature by targeting English secondary school teachers. RQ1 was measured though self-reports, observations and intelligence feedback practices, as identified in Sections 3.10 and 3.10.

5.1.1 Self-report and Observations

Across all participants (*n* = 10), six endorsed high incremental theories of intelligence, self-reporting a score of 1-2 on the theory of intelligence questionnaire (see Claro, Paunesku & Dweck, 2016). Four participants were categorised as mixed believers, reporting an aggregated score between 2.1 and 4.9. One mixed believer was bias toward an incremental theory of intelligence, scoring 1.25. While three mixed believers were bias towards an entity theory of intelligence, all scoring 3.25. No participants reported strong entity beliefs, reporting a score of 5 or above.

It is not surprising there we no teachers self-reporting an entity belief, given that research indicates the teacher population is more likely to report an incremental theory based on social desirability (Song, 2018; Yu & Kreijkes, 2017). Furthermore, research suggest fixed theorists in the teacher population may be difficult to sample, given that a large number of teachers have engaged with mindset training in schools (nine in the present study) (ibid). The results of this Doctoral research, however, discovered that teachers were able to verbally express entity beliefs (Participants 9 – 10, P9 - P10). This finding prompted further discussion, below and in Section 6.1.3.

5.1.2 Self-Reports and Interviews: Data Triangulation of Participants Theory of Intelligence

Within interviews, participants were asked to express their beliefs about intelligence, whether intelligence is fixed or malleable. The aim of using both self-reports and interviews was to ascertain whether participants self-report corresponded with the beliefs expressed verbally. Research indicates that using interviews to express beliefs provides a more accurate representation of an individual's belief (Pajares, 1992; Rokeach, 1969) (see Sections 3.3. and 3.12). Comparing self-reports and participant response in interviews, results indicated participants self-reporting incremental beliefs, or mixed beliefs bias toward incremental beliefs, also expressed incremental beliefs in interview statements. While two of the three participants expressing mixed beliefs, bias toward an entity theory, verbalised entity beliefs of intelligence – thus, suggesting they held stronger entity beliefs than self-reporting in the Theory of Intelligence measure (Dweck, 1999). Consequently, data from this Doctoral research indicates that those participants holding mixed beliefs, which are not strongly associated with incremental or entity, would benefit from additional questioning in order to ascertain their theories of intelligence (see Section 7.3). Further implications of the nuances of self-repots in comparison to interview data are discussed in Section 6.1.3.

5.1.3 Previous Engagement with 'Growth Mindset' Training

Nine participants indicated that they had previously engaged with 'growth mindset' (In-Service Training/INSET or own research), and were presumably aware of the postulated benefits of holding an incremental theory of intelligence (ibid). Of the nine participants who had engaged with INSET training or own research, six self-reported strong incremental beliefs, one self-reported a mixed belief bias toward an incremental theory of intelligence and two self-reported a mixed belief bias toward an entity theory of intelligence. Thus, 66.7% of participants who had engaged with growth mindset training and/or research reported strong incremental beliefs.

Results from this study indicate that previous engagement with growth mindset training or research does not always result in strong incremental endorsement, contrary to previous research (Hoffman & Seidel, 2014; Schmidt, 2015). However, it is important to note that there were no teachers self-reporting entity beliefs and the sample within this study was small (see Section 3.4). Therefore, it was not possible to further comment on teacher's self-reported beliefs and previous engagement with growth mindset training or research. Given the limitation of no entity self-reporting teacher participant in the sample, a larger sample size is a recommendation for future research, which would aim to address this (Section 7.3).

5.1.4 Theories of Intelligence and Video Recorded Intelligence Feedback

Across video recorded observations, all participants' displayed both incremental and entity feedback, irrespective of their self-reported belief. Feedback was categorised as incremental, entity and neutral in accordance with the observational categorisation guide (Section 3.10 - 3.11). All teachers displayed highest use of neutral feedback, which could be positively and negatively valenced, however, not directly related to incremental or entity socialisation (Mottet, 2008). Teacher attributions for higher use of neutral feedback were identified in interviews. All 10 participants referred to the use of neutral language to motivate students and ensure they were on task and therefore learning. Motivation in class encompassed various forms for participants, including behaviour management and creating a calm environment for learning. Furthermore, other participants also identified their use of neutral language was differentiated dependant on the pupil. For example, Participant 10 (P10) and Participant 9 (P9) both noted that their use of neutral praise, which recognises pupil success but is not valenced or associated with theory of intelligence (e.g., okay, yes, correct), related to their knowledge of the student. Thus, teacher beliefs of students affected their feedback practices (for further discussion, see 5.4 and 6.2). The overarching goal for teachers' use of neutral feedback, however, was to promote learning in the classroom.

Of those participants reporting incremental beliefs (*n* = 6), five provided higher frequencies of incremental over entity intelligence feedback. Those reporting mixed beliefs (*n* = 4), displayed more incremental over entity feedback, regardless of reported mixed beliefs bias. All four mixed theorists provided both incremental and entity feedback, which was to be expected given their mixed belief (Dweck & Elliot, 2007). However, the three participants bias toward an entity theory of intelligence and who expressed entity beliefs in interviews (P8, P9 & P10), displayed higher uses of incremental feedback, comparative to entity. Taking results from those with both entity mixed bias self-reports (three) and entity reporting in interviews (two) suggests mixed theorists with entity bias and those able to verbalise entity beliefs, do not provide more entity intelligence feedback, for further discussion see Section 5.4 and Chapter 6. Out of all participants, one used higher frequencies of entity feedback (P1 - see Table 5.1), comparatively to incremental feedback; despite self-reporting a strong incremental theory of intelligence (score of 2) and expressing incremental beliefs in the interview. Frequencies of participant feedback categorisation in individual observations are presented in Table 5.1.

Table 5.1 Intelligence feedback frequencies of individual teachers and self-reported theory of intelligence

Teacher	*Incremental Feedback*	*Entity Feedback*	*Neutral Feedback*	*Self-Report Result*
P1	5.8%	17.4%	76.8%	2 – INC
P2	7.3%	2.7%	90%	2 – INC
P3	29%	3.4%	67.6%	2.25 - MIXED
P4	6.9%	14.9%	78.2%	1.25 – INC
P5	27.2%	1.9%	70.9%	1 – INC
P6	26.2%	1%	72.8%	2 – INC
P7	23.3%	3.4%	70.3%	1.5 – INC
P8	29.8%	3.4%	66.8%	3.25 - MIXED
P9	21.4%	5.2%	73.4%	3.25 - MIXED
P10	11.5%	2.5%	86%	3.25 - MIXED

Examples of contrasting intelligence feedback in the observation were frequent across all participants. Noted, for example, when P2 praised their class for hard work and promoted effort and persistence when faced with challenge (incremental intelligence feedback). Later, in the same lesson, the P2 praised a group of students for speed of completion (entity intelligence feedback). Praise for speed completion suggests if individuals can not complete tasks at speed they lack intelligence, as intelligence which is fixed and innate should be natural and retrieved instantly, rather than the result of effort (see Rattan et al., 2012; Snyder et al., 2014). A further instance was observed when P7 praised one of their students for completing all five answers quickly, and asked another student to stop working; as there was no time to answer questions. When discussing the recorded section further in P7 interview, using stimulated recall, P7 noted the student who did not complete the question may have had better answers. However, P7 did not prompt the student to provide an answer later in the group discussions, despite their stated beliefs that this student may have had more in-depth answers. Therefore, P7's use of challenge was not incrementally based and non-aligned with his self-reported theory of intelligence. Contrasting language was also displayed in the lessons of the participants (*n* = 4) self-reporting mixed theories of intelligence. Including failure to provide challenge to students following work completion (entity intelligence feedback), while encouraging persistence in some tasks (incremental intelligence feedback).

5.1.5 Feedback Frequencies in Relation to Codes

Although data collected were from secondary school teachers, video recorded observations were across differing lessons, year groups, schools contexts and abilities. Therefore, the data could not be compared, between teachers. However, it was possible to identify the most common frequencies across all teacher feedback. The observational data highlighted incremental feedback were most frequent in participant use of challenge, observed 197 times. While participant entity feedback were also most frequent in challenge feedback, observed on 59 occasions. Total frequencies of all teachers were combined, to provide overall frequency distribution in relation to the observation guide, and are presented in Table 5.2:

Table 5.2 All participants - Observation Feedback Frequencies

	Inc	*Ent*	*Neu*	*Total*
F/E	21	7	11	39
Fb-	0	1	14	15
Fb+	6	2	208	216
Fb	0	0	278	278
C	197	59	11	267
Sf	83	1	12	96
Cf	0	2	0	2
G	7	0	0	7
ML	0	0	622	622
Total	314	72	1156	1542

Within the observation there were many instances where teachers challenged students through using questioning strategies to develop answers and encourage students to expand their answers. Although this was not always the case, where teachers' failed to challenge students through providing answers or moving on. For full data frequencies of individual teachers see Sections 4.5 – 4.14.

The findings in relation to RQ1 reflect the current qualitative work of others, where non-alignment between teachers' intelligence beliefs and their instruction is noted (Rissanen et al., 2018a). For example teachers not challenging students' entity behaviours (as identified in

P1 and P2 observations), regardless of their own incremental beliefs. There were also a number of instances across the observations, however, where intelligence beliefs and feedback practice were congruent- reflecting key features of incremental feedback pedagogy. For example, supporting student's individual learning processes, promoting mastery orientation across tasks, and fostering process-focused thinking (Rissanen et al., 2019).

5.1.6 RQ1 Summary

Overall, the data from this study indicated secondary school teachers did not always actualise their self-reported theory of intelligence, through their intelligence feedback. For example, all teachers provided entity and incremental feedback. While there were more uses of incremental feedback, comparatively to entity, from nine of the ten participants; regardless of stated belief. Given that previous research has indicated teachers do not always enact their intelligence beliefs in practice, non-alignment was expected (Rissanen et al., 2018a; Rissanen et al., 2019; Sun, 2015). However, the findings of this thesis are unique, given that previous research has not been undertaken in English secondary schools. In-particular, using pre-existing research to form an observation framework and underpin observation. Further data analysis were undertaken in an attempt to understand intelligence belief enactment, in light of the above findings, as discussed in Section 5.4 and Chapter 6.

5.2 RQ2. What types of intelligence feedback do teachers' believe they socialise to students?

The purpose of RQ2 was to gain further insight into teacher's beliefs about their own use of intelligence feedback. Research suggests there are two types of intelligence feedback which are correlated to intelligence beliefs (Haimovitz & Dweck, 2017; Rattan et al., 2012; Skipper & Douglas, 2012), however current research is limited, and predominately quantitative (see Sections 3.10 - 3.11). The aim of RQ2 was, therefore, to go beyond correlation data, and attempt to understand teacher interpretations of their own intelligence feedback through rich data collection and analysis. With particular focus on reflection of observational recorded events, in-situ, through stimulated recall and interview discussion.

Teacher intelligence feedback was related to the types of feedback they provided across lessons (e.g., correct/incorrect answers, providing prompts, use of strategies, etc.). Intelligence feedback was also linked to a specific intelligence feedback practice categories, such as teacher challenge or teacher response to student failure/error. Categories were further coded in relation to incremental, entity and neutral feedback (see 3.10 and 3.11 coding framework). Teachers were directly asked about their use of intelligence feedback, in order to evoke reflection, specifically on their language, and thus feedback, across lessons. Results within this Section relate to both teacher reflections on specific intelligence theory codes, as per the observation, as well as teachers' own comments regarding their use of intelligence feedback.

5.2.1 Does Intelligence Feedback Matter to Teachers?

When discussing teachers' intelligence feedback, all participants believed it mattered the types of feedback they conveyed to students, notably about students' intelligence. For instance, teachers stated:

> *Yeah I think it does [matter]. Because if you constantly send messages of... 'Oh I don't think you're intelligent and you'll never get this' That's going to, well, demotivate them [students] – (P5 – Incremental theorist)*

> *Yes, I think they're very aware [about teacher intelligence feedback], that class in particular, they are very aware of the fact that they feel as though they're not as clever as everybody else… I think 'I must make an effort to acknowledge them'. So I don't want to give them the impression that they aren't capable of achieving what other people are capable. I think whatever you put your mind to, whatever you want, you can get it – (P4 – Incremental theorist)*

> *I do think it matters. Yeah. Because I think… Realistically… a few of them are not going to make the standard to pass. But I would never tell them that. (P3 – Mixed theorist, incremental bias)*

Teachers', regardless of their own expectations, were concerned with ensuring students could achieve and attempting to promote 'positive' feedback of intelligence. For example, despite P3's students being in lower set, and lower set students believing they were of lower ability (comparable to those in higher school sets), she still attempted to send positive intelligence feedback to students. Stating:

> *I'm not just teaching them like 'right you're just bottom set, com'on let's just do like baby work' I am actually trying to push them to pass. So, I do think it's important, because, you know, some of them in there… like could, hopefully, will [pass]…*

In relation to P3, intelligence feedback mattered because it provided an opportunity to challenge students' lower expectations. While also ensuring P3 was striving for students to pass, through high expectations, a key aspect of her professional role as a teacher.

Data were further explored in relation to why teachers' believed intelligence feedback were important. For instance, data indicated that some teachers were concerned about the types of feedback they socialised to students as verbal feedback could affect motivation of students. This was highlighted, for example, in P9's interview. When asked about what types of intelligence feedback P9 sent to students, she stated:

> *Hopefully that I believe that they are, even if I don't, I genuinely… this is another thing. It's like hard. I genuinely believe if I tell a kid they are good at it and I can make them believe it, then they will try. And they may never be as good as their ridiculous target is, but they will improve and they will enjoy it. And even if they don't get a great mark in their exam, they know it. So I genuinely believe if they believe they are good at it. Not only will they behave, but they will get something from it. ' (Mixed Theorist, Entity Bias)*

All teachers' stated that their students were aware of the types of feedback they inferred through intelligence feedback. Usually students were aware of their intelligence through teacher feedback, combined with other pre-existing structures, such as targets. Therefore, teachers identified that it was important to be aware of the impact of wider school context (e.g., exams and targets), their own practice (e.g., praise type and feedback) and beliefs; in relation to their students' motivation, academic outcomes and emotion. For example, P10, despite her entity bias, identified that:

> *It's important that you do encourage them to keep trying and not to have like....'I'm just targeted a 3' so I'm just going to get a 3. So I think they need pushing to be more intelligent… and to learn how to be more intelligent.*

Indicating that she held beliefs about motivating students regardless of targets, which she believed imply students' intelligence. Thus, it was important for P10 to ensure she encouraged students to move beyond the predetermined intelligence generated from school data; which, ultimately, could have a negative impact on student progress and achievement.

5.2.2 Teacher's Beliefs about Their Own Intelligence Feedback

When discussing with teachers what types of feedback they believed they sent to students, all teachers responded with predominately incremental language. All teachers expressed that they attempted to convey feedback conductive to learning, which were coupled with other beliefs about what constitutes as learning and progress. For the six participants self-reporting strong incremental beliefs, they stated beliefs about their own intelligence feedback, which was also reflective of their incremental beliefs. Statements which were aligned with teachers' incremental socialisations included:

> *To help with progress… I never say they can't do it (P2 – Incremental Theorist)*
>
> *Whatever you put your mind to, whatever you want, you can get it (P4 – Incremental Theorist)*
>
> *It's okay to make mistakes. As long as we correct ourselves and see how we can improve, that's all that we can ever do (P5 – Incremental Theorist)*

Comparatively, to those reporting incremental theories (including mixed theory with incremental bias – P3) (*n = 7*), teachers who self-reported mixed belief with an entity bias (*n = 3*), also expressed statements which were reflective of incremental beliefs. Therefore, their explicit intelligence beliefs were not aligned with their beliefs about socialising intelligence feedback. Specifically, they hoped their feedback to students encouraged students to set high expectations, learn to be independent learners, and would motivate students through praise:

> *You have to be independent. You have to build your independence. I like channelling them both, by forcing them to do independent work, but by praising them for doing it. (P10 – Mixed Theorist, Entity Bias)*
>
> *I genuinely believe if I tell a kid they are good at it and I can make them believe it, then they will try. (P9 – Mixed Theorist, Entity Bias)*
>
> *They need to have that growth mindset as much as teachers need to have a growth mindset. And if you can be a model and have growth mindset, I think then you can be a model and teacher pupils to have that same attitude. (P8 – Mixed Theorist, Entity Bias)*

Overall, irrespective of self-reported theory of intelligence, teachers stated they believed their own intelligence feedback to students were aimed at supporting and encouraging students across learning events, as required of teachers within their roles.

5.2.3 Negative Feedback and Entity Practices

There were, however, some instances where teachers self-identified negative feedback to students. Data also indicated that what teachers believed about their feedback practice and what teachers enacted in their practice, were non-aligned. For example P2 (an incremental believer) identified her feedback as "positive", while also noting she had called students

”idiots”, inferring low intelligence. However, she was keen to stress in her interview that negative language was used in a humours manner and did not infer a student lacked intelligence. P2 indicated it was important to consider teacher context, and teacher relationships with individual students – as this affected her intelligence feedback. As noted in the following quotation:

> *I do call idiots, idiots, but I also joke about it. I don't… I don't, literally look at a child and go 'you're the most idiotic, ridiculous and scream at them. Because that's just not my way of teaching anyway - P2*

Furthermore, all teachers engaged in some degree of entity feedback, and therefore socialised entity intelligence, regardless of their stated beliefs. Examples included teacher use of entity praise (P1), entity criticism (P2), entity strategies (P2), entity response to failure and error (P2, P3, P4 & P9) and entity challenge (all participants, P1 – P10) (see Appendix 10). Results therefore highlight non-alignment between teachers' beliefs about intelligence feedback and intelligence feedback in-situ.

5.2.4 Summary of RQ2

All teachers within the study believed they socialised incremental and, or, "positive" feedback to students, specifically through their use of intelligence feedback practices in lessons. Teachers overarching beliefs were centred on learning, student progress and their role as a teacher, identifying that they aimed to motivate students through socialising hard work, independent learning and positivity. Despite their best intentions, however, there were times when teachers failed to provide incremental feedback, resulting in entity or neutral feedback practices. Consequently, results suggested that teachers were not always conscious of their feedback practices. For further discussion see Chapter 6.

5.3 RQ3. What are teachers' beliefs about internal and external factors in relation to their intelligence feedback?

RQ3 was designed to explore teacher beliefs about factors, both internal (e.g., self) and external (e.g., context), which may affect their use of intelligence feedback. Current research suggests that teacher practice is influenced by various factors (Buehl & Beck, 2014; Fives & Buehl, 2012) (see 2.3), including student interactions, wider policy, curriculum and other beliefs. More specifically, in relation to intelligence beliefs and intelligence feedback, research indicates it is external cultural factors which guide teacher intelligence feedback, irrespective of intelligence theory (Rissanen et al., 2018a; Rissanen et al., 2019). Consequently, RQ3 aimed to investigate teacher stated factors which affected their intelligence feedback, in an attempt to further understand the relationship of teacher intelligence belief and teacher intelligence feedback.

In order to investigate RQ3, data were coded in relation to teacher identified internal and external factors, which teachers stated affected their intelligence feedback. Therefore, data were analysed deductively (see Section 3.14.1), given that internal and external factors were taken from Buehl and Beck's (2014) framework (see Section 2.5). They were also analysed inductively, where emergent themes of internal and external factors, as identified by teachers (see Section 3.14.1). As the five schools within the sample were different contextually (see Appendix 9 for school demographics), and the 10 teachers taught classes of varying size, ability and subject, multiple factors were identified, coded and categorised (see Section 3.14.1). However, there were a number of reoccurring themes across interviews. Themes were identified from codes, where teachers, despite contextual and situational differences, cited the same factors which affected their use of intelligence feedback. Findings in relation to RQ3 are discussed below.

5.3.1 Intelligence Feedback and Situational Factors

In interviews, participants identified multiple factors which affected their intelligence feedback, including their beliefs about students, perceptions of their role as a teacher and school and national policies (for an extensive list see Section 3.14). Most prevalent across codes were teachers' beliefs about situational factors within their school and classroom (e.g., internal and external factors affecting behaviour). All teachers identified examples where situational factors affected their intelligence feedback (see Table 5.3), as well as other classroom practice. For instance, teacher reducing level of student autonomy if misbehaving (P3). Situational factors were, in this Doctoral research, specific to teachers' school or class context and usually embedded in additional internal and or external factors (e.g., wider school context, situational factor with specific interaction with student). For example:

Table 5.3 Teacher Comments of Factors Relation to Intelligence Feedback

Participant & Self-Report	***Factors attributed to teacher use of intelligence feedback***	***Code***
1 – Inc	[On teachers' use of entity intelligence feedback] Well it's because of the amount of work she does and things like that, so I'm guessing she's probably getting sick of people being on at her all the time. Like right go and do it again. Do this, you need to get this right… I don't know… she is just lazy. She's very lazy.	*Situational Factor (internal & external)* – Belief about external factor, other staff "having a go" *Attribution for own behavior (internal)* – Responding in this way as a result of student *Belief about Student (internal)* – Lazy
3 – Mixed (Inc bias)	I mean I think, in an ideal world, if every kid… if you could guarantee that every kid was going to behave… mixed ability sets would be the way forward… So, along this corridor you were going to have 5 classes that all were mixed ability to try and help all of them, but we [senior leaders] guarantee you no behavior problems - you'd be able to do it…	*Situational Factor (external)* – Behaviour of students in school *Ability level (internal & external)* – Role of setting in school *Support (external)* – levels of support within school/context
8 – Mixed (Entity Bias)	[Intelligence feedback is] probably not as specific as it should be… I'm very much 'well done, you have explained that in detail' …or 'girls, did you see how Katie did that?'…it highlights the importance of the answer and also brings back the focus that we should be listening to each other. Because sometimes I think that they will switch off…	*Situational Factor (external)* – Ensuring students remain focused *Lack of engagement (external)* – From other students (e.g., switching off) *Belief about intelligence feedback (internal)* – not specific enough
9 – Mixed (Entity Bias)	I genuinely believe if I tell a kid they are good at it and I can make them believe it, then they will try. And they may never be as good as their ridiculous target is, but they will improve and they will enjoy it. And even if they don't get a great mark in their exam, they know it.	*Situational Factor (external)* – Targets set from data *Belief about Learning (internal)* – Providing an enjoyable learning experience *Internal Belief about Teaching Role* – Improving student outcomes

Within the above examples (Table 5.3), teachers identified a selection of situational factors (external) which they believed, affected their intelligence feedback. For instance, student behaviour, targets and degree of engagement. While all participant responses included situational factors, it was apparent from interviews that both (internal) beliefs and situational factors (external) were connected and interwoven, ultimately affecting their intelligence feedback.

For example, P1 identified that while she provided negative intelligence feedback to a student, her feedback was as a result of the external factors which shaper her behaviour. Specifically, school polices which were put in place in response to the students' low quality work and poor effort in lessons. Furthermore, P1 held personal beliefs (internal factor) about the student, stating she believed the student was 'lazy'. Thus, highlighting it was a combination of beliefs (internal) and context (external) which governed her intelligence feedback to the student, in the instance she was reflecting on. Another example can be taken from P9, who identified school targets for exams (external) affected student's academic perception. P9 believed (internal), however, that all students could be encouraged to try and feel as though they have achieved; therefore reflective of another belief about role as a teacher (internal).

5.3.2 Additional Factors

Following initial analysis, which yielded codes, codes which were reoccurring across teachers were identified as larger categories via frequency across teachers (see 3.14 for data analysis details). Through identifying common categories across teachers, it was possible to gain insight into some of the more specific factors teachers' believed affected their intelligence feedback. The most common categories teachers identified were the factors outlined below, which both affected their intelligence feedback negatively and hindered their role. It is important to note, however, that the external factors participants were citing were beliefs, which are internal factors. Therefore the quotes below identify commonalities across teachers' beliefs (internal) about external factors, which affect their practice, including intelligence feedback. For instance:

External Factor: Class-setting of Student (low, mid, high ability)

- *10 set 5 who I've just been teaching, who a lot of them, they resort to 'we're just thick' kind of 'what's the point? (P3)*
- *Yes, I think they're very aware [of setting], that class in particular, they are very aware of the fact that they feel as though they're not as clever as everybody else. So I don't want to make them feel inferior about that (P4)*
- *I would hope I give lots of praise. I think sometimes, we do tend to forget, but hopefully with bottom set. But actually one of the reasons why they maybe in that set is because*

they haven't been given that praise before and that knocks their confidence and they don't think they can do it (P5)

- *I think it's important that you do encourage them to keep trying and not to have like..'I'm just targeted a 3' so I'm just going to get a 3 (P8)*

Teachers identified that students may hold beliefs about themselves based on class ability setting, which in turn affected student effort and expectations. Setting also affected teacher practices, including intelligence feedback students, and their teacher-student interactions, with some teachers stating they may adopt a parental role (P3) with their students or hold lower expectations (P2) for low sets. While other's (P5, P8, P9, P10) noted a key part of their practice, and beliefs about their role, was to encourage students to work, feel valued and be confident – in order to counter act the negative effects of pre-determined setting.

Similarly, exam targets set within school were identified, for the most part, as an external hindrance to teacher's role. Teachers also believed targets could be detrimental to student perceptions (P3) and expectations places on teachers (P10). As well as unrealistic, given the calculations of grades based on unrealistic or unrelated data for some subjects (P6, P7, P8).

External Factor: Student Targets

- *In response to targets as a limitation to success: I think so yeah…not necessarily in my teaching. But the school culture. Can put them in a bracket, and it can be ceiling for them. So they should be aiming high (P8)*
- *Some are realistic, some probably need looking at again, but that's out of my control. Because they're whole school targets that have been set for them (P8)*
- *So they could be targeted a 9, but actually – their ability in dance isn't that great. So they might have taken the subject at KS3 and enjoyed dance, but actually no one's actually looked at their practical ability and their target is based on their KS2 data. And that's not got anything to do with the dance practical – so they're not relatable sometimes (P8)*
- *And I'm expected to get them all a GCSE. Which is ludicrous in itself. Now I say it out loud to you its fucking ridiculous (P9)*
- *Yeah, and you sort of have…to answer to your superiors. So, there's a girl in there called Cassy, she's the one that dances on the video – which would deem her intelligent. She's bright, it's the equivalent of a B, you know, that's really good. But really, she's working at grade 4. So, she requires a lot more scaffolding, then you take her book to a book meeting and they go, why is she getting scaffolding when she's a grade 7?! She's not though (P10)*

Another external factor was identified from participants' comments on student behaviour. Predominately, disruptive student behaviour was a noted as a hindrance to teaching and learning. However, also related to teacher use of intelligence feedback, where teachers use of intelligence feedback was affected. For example, lower uses of in-depth feedback as a result of ensuring students are on task (P10). As well as students failing, due to poor behaviour, thus affecting teacher intelligence feedback negatively (P2):

External Factor: Student Behaviour

- *Because from lesson to lesson I know they say that you've got to reaffirm knowledge, but you've got to reinforce behavior too (P1)*
- *When they decide that they want to hit each other with a ruler instead of listening to me then I get frustrated with them. And when they fail that's when I'm annoyed because they've been too busy faffing about (P2)*
- *But If I spend time with a singular member all of a sudden Kelsey will be having a full-on conversation and I will know she's still got a 12 mark question to do. Because she's still finding every distraction. So, the reason for that is so I can say to her I can see that you're off topic, and I can see that you're not on topic, I know you need to do it, and you know you need to do it (P10)*

Student background, including home life, out of school experience and level of subject engagement outside of the classroom, were further identified as impacting on student intelligence and teacher intelligence feedback. Students who were engaged within their subject outside of school were, in teacher's opinions, more likely to succeed (P3, P7, P8). Therefore, teacher's held higher expectations for students who were involved in their subject external to school, which affect teacher use of intelligence praise.

Participants expressed beliefs about external factors which affected their perception of students as well as potentially hindered student success, for example parents, knowledge of pastoral issues. Again, participants identified that external issues may affect how they interact with students, and the types of feedback they will provide (P1, P2, P6, P7). Citing knowledge of students as affecting teacher beliefs about students, which in turn affects feedback.

External Factor: Student Context/Background

- *So their home. I've got a feeling that Megan and TJ's isn't the best (P1)*
- *Even if he's done something in class, you've got to reinforce it because… I know he's got a bad home life, or had. And he never does his homework, and he can get away with just being the child that you don't really notice (P2)*
- *But her ideas for product design are just fantastic and the head of DT was saying to me, would you have thought if the issues she had in term 1 hadn't been resolved do you think we'd be here now? And I was like 'no'... Because they were pastoral issues (P6)*
- *I think if you've got the right environment in school or the right environment at home and your conduct and attitude in school, is, is good. Then I think you can pick up as much as you want (P7)*

- *Some have had some lessons, in a peripatetic sense... They're always in the practice rooms, they take part in the school bands (P7)*
- *My high ability will definitely be able to hit it because she also dances outside of school, which helps her out (P8)*
- *Some kids… there are some who struggle academically, and when you meet their parents or see their parents you think okay that's genetically linked (P9)*

A further category, was teachers' beliefs about student effort. Particularly, attributions for teachers own feedback in response to student effort. At times teachers identified they were frustrated with students, due to poor effort, affecting their feedback (P1, P3, P6). Other teachers expressed they held effort expectations for different pupils, based on their knowledge of individuals (P3, P7). While the belief that confidence was encompassed in effort, was an additional observation (P5). All beliefs about effort affected teacher feedback.

External Factor: Student Effort

- *I know my set 5 can do better, but they choose not to do better (P1)*
- *I'm annoyed at them because they've got the ability… But they're choosing to not utilize it. Whereas there are children who are working harder, who are probably, you know, they probably struggle with English more than they do, who are working a lot harder (P3)*
- *I think that a child who isn't confident won' necessarily revise because they think 'what's the point, I can't do it anyway (P5)*
- *So, then if I say 'I'm going to give you a couple of minutes' they know I won't forget, because I'm not going to stop (P6)*
- *Sometimes some people can finish a lot quicker...it doesn't necessarily mean the quality of work is going to be better than the other. To really, punish Duncan say 'why have you only got 3?' I didn't want to belittle him, in front of the rest of the class… so the reason why I said put your pen down and listen, that's getting him ready to ensure he's going to listen to the next section and hopefully pick up the next instruments so he will know exactly how to answer the question next time around (P7)*

Given the various reoccurring codes, which yielded larger categories, results within this Doctoral study indicated that teacher intelligence feedback, and therefore in-situ practice, could not be removed from participant beliefs about external factors.

5.3.3 Student Centered Approach to Pedagogy

Analysing the data and categories above (e.g., class setting of students, student targets, student behaviour, student context/background and student effort) a larger theme emerged. The theme which appeared to be most salient to guiding teachers' intelligence feedback was adopting a student centered approach to teaching and learning. Within the literature, a student centered approach to instruction has been defined as “holding students responsible for their learning, and using self-paced and/or cooperative learning” (Felder & Brent, 1996, p. 43). A student centred approach to pedagogy also includes collaborative dialogue between the student and teacher about learning and lesson materials (Knowlton, 2000). Definitions of a student centred approach highlight students are at the centre of teaching and learning, with pedagogical tasks designed to involve and engage students in their own learning. A student centred approach therefore takes the active involvement and consideration of students in teachers’ pedagogical decision making, including feedback (Knowlton, 2000).

While the data highlighted a student centred pedagogical approach was relevant to teachers’ instruction in this Doctoral study, teachers’ of the current study expressed that the most important element of their intelligence feedback was to consider individual students. Consideration of individual students in intelligence feedback was based on their relationships, knowledge and interactions of their students. Teachers stated in interviews that they designed tasks, feedback and learning environments to involve students. Most important to teachers was the consideration of the individual’s background, affecting teacher-student interactions, and defining the student centred approach to intelligence feedback in this Doctoral research.

In response to questions surrounding teacher practice and, specifically, intelligence feedback, teachers’ stated they consider a combination of various internal and external factors, which determined how teacher’s interacted with students and provide intelligence feedback. For example, individual student characteristics, pre-determined grades, motivations and social background. Therefore, taking a student centered approach to their intelligence feedback. Other examples where teachers identified specific instances of taking a student centered approach are outlined below:

> *Matt the other day got, 10 out of 10 on something that he wasn’t expecting to. So obviously, I mean they were quite easy questions, but for him it was quite a step in the right direction. In terms of building, I suppose, our relationship, and for him to… focus and work in class. So, I like to think I do it [use intelligence feedback] more based on what I know of the child. Rather than their ability. (P3)*

In the above quote, P3 described her use of intelligence feedback in accordance with her beliefs about the individual student, rather than her own mixed (incremental bias) intelligence belief. This was also identified in the interview with P2, who commented on her intelligence related feedback, when students were unmotivated or off task. P2 stated:

> *I just do positive reinforcement, you know. You've done a really good job, all you need to do now is this, this and this… If I don't help her with some things she will just sit there. So, like I've taken her sketchbook home and I've put post-it notes in it. And sometimes I'll enhance a little bit of her drawing and I'll go "this is what I'm looking for..." or I'll put the photos in a certain, specific way*

P2 identified that the student would not always work, as the student was unsure of how to progress. Therefore, assisting this pupil in a way which was conductive to learning, for the individual, was most effective. Notably, intelligence feedback were conveyed through 'positive reinforcement' across tasks. A further example is taken from the interview with P7 who stated:

> *Because there are a lot of kids that...need positive reinforcement. To let them know that they are on the right track…. So... I think telling them, and I was genuinely impressed… he chose something more elegant. And yeah, I was happy with his answer, so therefore, I am going to let him know that I am happy*

Again, this excerpt from P7's interview demonstrated how P7 considered individual students when giving intelligence related feedback. P7's practice was interwoven with the task, student expectation and belief about what students required in order to learn and be motivated across lessons. Thus, to summarise, both internal beliefs about students and external situational factors appear to play a role in affecting the enactment of intelligence feedback in practice.

5.3.4 Summary of RQ3

To summarise RQ3, there were multiple factors which affected teachers' intelligence feedback, however, these were ultimately encompassed within additional beliefs. Teachers' expressed strong views about situational factors which negatively impacted on their roles as teachers, and, as a consequence, affected their intelligence feedback to students. Most prevalent across interviews were teachers' statements surrounding their student centered approach, identifying that responses to students, and teacher use of intelligence feedback, is dependent on the student.

All participants within the sample, displayed both incremental and entity practices, irrespective of stated belief. When reflecting on observational video footage, they could verbalise why they had provided feedback and how this related to their internal beliefs about students as a whole, as opposed to their beliefs about intelligence. Given that results indicate participants' intelligence beliefs and intelligence feedback are not always aligned (see 5.1. RQ1), and teachers can identify factors which affect their practice, it could be suggested that internal and external factors play a larger role in guiding behaviour than current research suggests (Haimovitz & Dweck, 2017).

5.4 Discussion

Exploring the RQ's in relation to other literature and findings, this Section explores some of the literature presented in Chapter 2. The aim of the discussion section is to link the analysed data, undertaken in relation to the RQ's, to other findings, therefore placing this study in the wider literature. The section also outlines limitations to the coding of the work and links to the recommendations of Section 7.3.

5.4.1 Non-Alignment of Intelligence and Intelligence feedback (e.g., Practice)

Findings of non-alignment between teachers' intelligence beliefs and socialisation of beliefs through intelligence feedback (RQ1) reflects some of the current research, whilst also identifying potential areas for further investigation.

Haimovitz and Dweck (2017) suggest intelligence feedback is in response to student achievements of successes or failures. Activation of intelligence belief in the Haimovitz and Dweck (ibid) model is either alone or in parallel with theories of how to motivate children, resulting in incremental or entity practices (see Section 2.2.1). The "other belief", of motivation, is postulated to cause non-alignment between teacher intelligence and practice. At present the model remains untested. Therefore, when examining the results of this PhD study, teachers' appeared to act in accordance with their beliefs of intelligence, as hypothesised by Haimovitz and Dweck (2017).

However, occasionally, teachers did not socialise their self-reported theory of intelligence, or stated theory of intelligence in interviews, in their intelligence feedback. Teachers also identified, in interviews of the current research, additional beliefs which affected their verbal feedback, as previously identified in Section 5.3 (e.g., knowledge of students, targets, effort and school environment). Thus, beliefs of motivation were encompassed within teacher intelligence feedback and intelligence belief socialisation, again in line with the model by Haimovitz & Dweck (2017). Overall, results from this study indicate teacher intelligence feedback is guided by a complex system of internal and external factors (see Section 5.3). Further discussion on this system, underpinned by findings from this study, is provided in Chapter 6.

In the observations of the current research, teachers' appeared to respond to various learning events, rather than simply achievement events (e.g., success or failure), again, as proposed by Dweck and Haimovitz (2017). Learning events in the data of this Doctoral thesis were identified as any event related to learning or learners. Learning events included teachers monitoring learners across tasks, encouraging or reprimanding learners and learners attempting making progress across tasks. As well as students seeking clarification of tasks or becoming distracted from learning, with teachers required to respond to learner needs and progress across the lesson. Key to learning events were teachers and their monitoring, noting and management of the classroom. As discussed previously (Section 1.1.3), "noting" is an integral element of feedback, where teachers decide which events to respond to and which to ignore (Ruiz-Primo & Brookhart, 2018). Therefore, teacher's individual judgement may also play a role in the relationship between intelligence belief and intelligence feedback.

Most prominent, within the interview data of this Doctoral study, was the theme of teachers acting in accordance with their beliefs about individual students in learner events, thus, a student centred approach. Teachers of this study held various beliefs about their use of intelligence feedback, which were interwoven with external factors (e.g., exams, targets, time, student background, knowledge of student) and internal factors (e.g., beliefs about individual students, beliefs about role as a teacher, beliefs about classroom environment). Given that teacher roles are interwoven with their school context, as well as multiple beliefs, teachers responding to learning events would be more appropriate to suggest as guiding their feedback. As learning events encompass and appreciate the naturalistic environment of teachers in classrooms.

Overall, the findings of this research are most aligned with research in Finland, which explored teacher meaning systems in naturalist environments, through the same research methods used within the present study (e.g., self-reports, interviews and stimulated recall) (Rissanen et al., 2018a). Rissanen et al., (2018a) focused on teacher interpretations of student learning, indicating theories of intelligence create a meaning system for the interpretation of student learning. Thus, it was the interaction and connection of various beliefs, within teacher meaning systems, which influenced teacher practice. The results of this thesis also suggest teachers have a wider meaning system, identifying teachers were concerned about students as individuals and enacted in accordance with their own interpretations of their role, therefore, affecting their practices. Potential mechanisms, meaning systems and implications are discussed further in Chapter 6.

5.4.2 Specificity of Belief and Ecology

Interview data with the teachers of this study indicated theories of intelligence were seldom referenced, and it was other beliefs which guided their practice. It could be argued that this is because intelligence beliefs are proposed as 'implicit', however, as previously discussed (see 2.9), the intelligence beliefs of teachers can be explicitly accessed - through questionnaires and interviews. Therefore, intelligence theories cannot be implicit. Teachers of this study were also directly asked about their intelligence beliefs, and all provided answers as to their beliefs of intelligence (see Section 5.1).

Given that there were other beliefs identified by teacher, which teachers' stated influenced their feedback practice, literature pertaining to the belief-practice relationship were drawn upon. When exploring teachers' beliefs in the work of Fives & Buehl (2012), the specificity of the belief within a context is deemed most important. For instance, if the situation which arises activates the belief under investigation (e.g., student is misbehaving, teacher's beliefs about the student and behaviour management are activated to respond accordingly). Applying Five & Buehl's (2012) logic to theories of intelligence, learning events require teachers' to draw upon their beliefs about intelligence. However, in the current research, teacher belief did not always align with teacher practice (RQ1).

It could be argued that teacher's beliefs of intelligence are not always activated as these beliefs are "general" and stable over situations (Dweck, 1999). As identified in research, individuals may hold different beliefs of intelligence across domains, which may account for non-alignment of belief and practice (ibid) (e.g., fixed intelligence in maths, but malleable intelligence in English). A further consideration is that intelligence beliefs play little, if any, role in guiding teacher behaviour - due to the overarching ecology which exists within teacher's roles (e.g., to teach students, to pass exams, to instil confidence etc. - see Section 5.3). A final consideration is that beliefs of intelligence form teacher attitude towards students (Fishbien & Ajzen, 1974; 1975), as teachers discussed their negative and positive judgements of students in interviews. However, attitudes were not the focus of the current PhD study and so not explored. Overall, it is acknowledged that there are other areas of research which would be useful to investigate, in relation to teacher intelligence belief and intelligence feedback, recommended for further study (see Section 7.3).

Overall, the data of this study indicated it is teacher’s beliefs about students and beliefs about the types of practices which will be conductive students to work, that are most salient to teachers’. Again, taking a student centred approach to intelligence feedback (see Section 5.3). The specificity and activation of the belief may therefore explain why teacher belief and practice does not align. Notably, as there are more salient beliefs to teachers (e.g., student centred approach and consideration of student background). Buehl & Beck (2014) also note that the congruence of the belief-practice relationship is influenced by the wider ecology of teachers, including internal (e.g., other beliefs) and external (e.g., national curriculum) factors. Although congruence between beliefs and practice is complex and requires in-depth analysis. Teacher data in this thesis identified multiple internal and external factors which could interact and affect the alignment of teachers’ beliefs of intelligence and intelligence feedback practices. Intelligence belief and intelligence feedback is therefore further explored in an alternative hypothesised model, underpinned by the current findings and data (Chapter 6).

5.5 Summary of Findings

To summarise, the data within this thesis indicates that intelligence beliefs (self-reported and verbalised in interviews) were not always aligned with intelligence verbal feedback (RQ1). Teachers indicated that their beliefs about their use of intelligence feedback were positive and incremental, to support learning of students. However, the data also highlighted that teacher intelligence beliefs about their own intelligence feedback was not always aligned to their actual intelligence feedback (RQ2). Finally, teacher’s held multiple beliefs about internal and external factors, which they stated could affect their intelligence feedback. The most prominent factor from data appeared to be teacher concern with a student centred approach, considering individual students, encapsulated within the overall teacher ecology (e.g., educational systems, school context, targets etc.) (RQ3).

There were identified limitations to the coding. For example, the researcher being the only coder of the work, due to ethical requirements, which limited corroboration between multiple coders to off-set bias. Multiple coders are suggested as a strength in research, as provides the opportunity to corroborate analysis and standardise interpretations (Church, Dunn & Prokopy, 2019). However, attempts were made to ensure trustworthiness across the current PhD study through transparency of methods and analysis. For instance, presenting coding guides, transcriptions and code definitions. It was also identified that some codes, which were taken from previous research in experimental conditions (Dweck, 1999; Rattan et al., 2012), were nuanced when applied to naturalistic scenarios. In particular, the relationship of speed completion and entity/incremental socialisations – as explored in the data analysis of Participant 4 (Section 4.11). Literature suggests praise for speed of completion is commonly associated with an entity theory of intelligence, as students are not facing challenge if they complete tasks at speed (Dweck, 1999). However, teachers cited the use of speed as a motivational strategy to encourage students to work harder through the challenge of completion at speed. It is therefore recommended that more research explores the relationship between speed completion and theory of intelligence, as teacher's used speed of completion to challenge learners.

Overall, data indicates that the relationship between teacher intelligence beliefs and their intelligence feedback is complex, affected by multiple other beliefs and context. Across data, all teacher beliefs were both similar in larger themes (e.g., consideration of individual students) however, situational in relation to unique school contexts (e.g., school policy and students). For example, in all schools there were teacher and student relationships, although teachers and students were in differing contexts (e.g., school type, school ethos and geographic location). Teachers' beliefs of individual students therefore played a large role in determining the types of intelligence feedback provided by teachers. Thus, through the analysis of data, it was possible to extract beliefs which interacted with theory of intelligence that in turn affected teacher intelligence feedback. Given the complexity of the current findings, Chapter 6 was deemed integral to further understand the relationship and mechanisms of intelligence beliefs and intelligence feedback. While also framing beliefs of intelligence within a larger environmental ecology, which influences teacher intelligence feedback.

5.6 Chapter Summary

The aim of Chapter 5 was to present the findings of the research, in relation to the three research questions highlighted in Section 1.2. Multiple findings were identified, which were identified as contributing to the wider body of literature in theories of intelligence and teacher beliefs. Notably, teacher theory of intelligence is not always salient to teacher feedback, as data indicated a combination of contextual factors and other teacher beliefs can affect feedback. Findings external to the RQ's were also discovered, although not included in Chapter 5. Instead, a phase-two analysis was undertaken as detailed in Chapter 6.

Chapter 6

Hypothesised Model and Discussion

(Phase Two Analysis)

Introduction

The following Chapter outlines the hypothesised model of this Doctoral thesis, generated through abbreviated grounded theory. The aim of Chapter 6 is to contribute a model of teacher belief and teacher practice, underpinned by the empirical data collected in this thesis. A rationale of model generation is discussed, as well as the presentation of data and discussion surrounding the model of the thesis. Recommendations are also provided in light of the model, with reference to previous literature.

6.1 Rationale and Overview

Following the phase one analysis (Section 3.14.1), in relation to the research questions and categorised feedback table (Sections 5.1, 5.2 and 5.3), phase two analysis was undertaken. There was a wealth of empirical data yielded from the empirical methods (self-reports, video observations and semi-structured interviews) that while not directly related to the research questions, generated further insightful findings. For instance, data from video recorded observations of teacher intelligence feedback which were not covered by previous theory of intelligence literature (e.g., neutral praise feedback). Interview data also yielded teacher identified external factors affecting feedback (e.g., school context) and other beliefs (e.g., beliefs about student). These data were examined as novel findings and insights into teachers' intelligence beliefs and intelligence feedback. As a result, further exploration of teacher intelligence feedback practices was undertaken through an abbreviated grounded theory (AGT) approach (see Section 3.14.2 details).

By exploring data in phase two of analysis, combined with RQ findings, a model was generated to provide insight into why teachers' theories of intelligence and intelligence feedback practices were not always aligned, as identified in Research Question 1 (Section 5.1). Using AGT, a model was created to propose a mechanism of what guides teacher intelligence feedback in-situ. The decision to probe and propose mechanism of teacher intelligence feedback was also reflective of the researcher position, identified as critical realism (see Section 3.2.1). Through applying a critical realist approach, the aim of the current research was to connect the empirical (e.g., observable, real experience documented by the researcher) and the actual (e.g., transpiring independent of the researcher), to understand the real (e.g., mechanisms, which may produce different events, when observing the same phenomena) (Alvesson & Skoldberg, 2009).

The hypothesised model presented in this chapter (Section 6.2) was formulated through following the analytical procedures of AGT (see Section 3.14.2), a six step approach, and retroductive analysis (see Section 3.14.3). Section 6.1 of this Chapter presents data which was identified through AGT (Section 3.14.2), while Section 6.2 presents the hypothesised model, and limitations to the model are provided in Section 6.3.

6.1.1 Research Questions and Analysis

As presented in the findings of RQ1, results from this study found that teacher intelligence feedback was not always enacted with theory of intelligence (Section 5.1). Therefore, one aim of the model proposed was to explain why intelligence feedback were not always aligned with intelligence beliefs. RQ2 indicated all teachers believed their intelligence feedback practices were conducive to learning, positive and suggestive of an incremental approach. However, all teachers engaged in entity and incremental intelligence verbal feedback practices, irrespective of self-reported belief (Section 5.2). Data highlighted, despite teacher beliefs and intentions about their intelligence feedback (e.g., incremental), teacher beliefs were not always demonstrated in actual practice.

The data yielded in RQ2 and RQ3 (Sections 5.2 & 5.3) identified teachers held contrasting beliefs about the nature of intelligence and their own intelligence feedback (RQ2). Teachers also verbalised that individual students, as well as additional external factors (e.g., school policy, class setting, exam pressure etc.), needed to be considered when discussing intelligence feedback (RQ3). For example, teachers' expressed beliefs that individual students were more socially intelligent, as opposed to academically intelligent, indicating complex beliefs of intelligence. Teachers' beliefs about student intelligence also affected teacher intelligence feedback to students, such as using humor in situations when students had made errors, given that these students were more socially intelligent (P2, P3, P8, P9 & P10). Teachers stated humor was important in their teaching, as indicated good rapport with students and created an enjoyable learning environment. In additional, intelligence feedback were tailored to the individual, including the use of humor, dependent on teacher-student relationships (see Section 5.3 for details). RQ3 also highlighted a number of additional beliefs about internal and external factors (e.g., beliefs about exams, student data and professional identity) which could affect teacher intelligence feedback to students (Section 5.3).

The theme which was most prevalent in interview data, was teachers taking a student centered approach to feedback, defined in this Doctoral research as the considerations of individual student background, affecting teacher-student feedback (see Section 5.3.3 for discussion). All teachers discussed and identified specific students as examples of considering a student centered approach when providing feedback. Teachers' used praise more often for students who, they believed, lacked confidence (P2), while increasing intelligence feedback for pupils with additional needs (e.g., Special Education Needs) (P4). Teachers were also willing to allow students to complete less work, based on their beliefs about individual student abilities (P7). Consequently, the model presented in this Chapter explored a combination of teachers' beliefs about intelligence (e.g., definitions and conceptualisation), other teacher identified beliefs (e.g., role as teacher), wider influences of teacher ecology (e.g., school ethos, students and times), and teacher intelligence feedback, from data collected.

6.1.2 Addressing Conceptual Issues of Theories of Intelligence

This section reiterates some of the conceptual issues surrounding theories of intelligence (see Section 2.2.4 for details), before presenting data, which aimed to account for shortcomings of enactment of theory of intelligence in classroom settings, as well as underpinning the model with data (see 6.2). Recognising and addressing previous conceptual issues with Dweck's (1999) theories of intelligence, the decision was made to question teachers, in interviews, about their beliefs of intelligence alongside their definitions of intelligence. Interview results, where teachers were asked to state their intelligence beliefs, were not initially used as a source of implicit belief measure for RQ1. Notably, as making intelligence beliefs explicit through teacher questioning, in interviews, was related to the wider nuance of 'implicit' theories of intelligence, as discussed below.

Dweck (1999) proposed incremental and entity theorists hold similar conceptualisations of intelligence as a construct (e.g., intelligence is the same for all). Dweck (ibid) suggests the definition of intelligence is not important, rather it is the agreed concepts which are important. For example, intelligence is malleable for incremental theorists, while intelligence is innate for entity theorists (ibid). Others, however, state a clearer definition of 'intelligence' in the theory is necessary for research consistency and clarity as Dweck has failed to provide an adequate definition of intelligence (Lüftenegger & Chen, 2017). Furthermore, intelligence across research literature is defined in multiple ways (e.g., multiple intelligence, fluid intelligence and general or specific) and not classed as a unidimensional construct (Anderman & Patrick, 2012; Furnham, 2014; Green, 2013; Jonsson, Beach, Korp, & Erlandson, 2012; Lüftenegger & Chen, 2017). Thus, arguably, the concept of intelligence is fundamental when exploring beliefs about intelligence. Notably, as the construct of intelligence is imperative to understand when measuring intelligence beliefs, as teacher beliefs underpin teacher practice (Buehl & Beck, 2014).

A further key issue in theories of intelligence is the accessibility of "implicit" intelligence beliefs. According to Lüftenegger & Chen (2017), if a belief is truly implicit it is inaccessible. While individuals can be unaware of a belief, which may drive their feedback, individuals can be asked to state their intelligence beliefs verbally or self-report them. Consequently, they make their beliefs explicit, as is true of any belief (Pajares, 1992; Rokeach, 1969) (e.g., all beliefs are explicit if they can be verbalised). Following the logic of previous belief research (ibid), this Doctoral study has suggested beliefs of intelligence are therefore not implicit, as detailed in section 2.9. Through the administered intelligence self-reports and direct questioning in interviews, teachers' were able to both explicitly report and define their beliefs of intelligence, implying implicit theories of intelligence, as defined by Dweck (1999) are not at all implicit.

In addition, Dweck's (1999) theories of intelligence, contains an overreliance on self-reports to measure theories of intelligence. Self-reports may be nuanced in the teacher population due to social desirability, favorable self-images and myside bias of teachers' practice (e.g., evaluation of evidence in a way which is bias toward an individual's belief – see Section 3.12.1) (Hoffman & Seidel, 2014; Yu & Kreijkes, 2017). Therefore, probing teacher conceptions of intelligence, as well as directly asking teacher about their beliefs in interviews, was deemed necessary to further understand teacher beliefs of intelligence. Overall, by asking participants to state their beliefs about intelligence in the current study, the aim was provide further insight into teacher conceptions of intelligence.

6.1.3 Interviews: Participant Stated Beliefs about Intelligence

Interview questions were used to prompt teacher reflection and discussion on their own beliefs of intelligence, which could be used to further understand belief and practice, as previously discussed (see Chapter 3). Responses from the interviews were matched to self-reported beliefs, for example, teacher beliefs which were reflective of an incremental or entity theory through the language used. Language were coded in relation to theories of intelligence, identifying teachers' incremental (e.g., emphasis on growth, effort and development) or entity responses (e.g., innate intelligence, students cannot achieve and not capable). The self-report and interview approach therefore provided two types of data for measuring teachers' endorsed intelligence belief, comparing self-reports to stated belief.

The table below presents results for each teacher from the questionnaire, teacher answers from the interview, degree of congruence between self-report and interview, and actualisations of belief in observations (Table 6.1). Answers were given by teachers to the following question:

Do you believe people have a fixed or changeable amount of intelligence?

Table 6.1 Teachers Interview: Beliefs about Intelligence

Participant	*Participant Response to: Do you believe people have a fixed or changeable amount of intelligence?*	*Self-Report*	*Interview*	*Observation*
P1	It's got to be changeable… because you develop through the years don't you. I mean… you do have a certain amount maybe of, like, being gullible maybe. But I think everything is constantly changing and nobodies the same person that they were in the past. So, I think intelligence wise it must change, you've got to be able to develop in some way. Even if it's tiny. I think personally, yeah…	2 - Inc	Inc	Mixed
P2	I think it depends... I really think it depends on the circumstance, so like I know my set 5 can do better, but they choose not to do better. Erm…I don't know, it depends on the type of kid. I think, coming from a creative background, like you, that there's always a way. Especially for the weaker kids, there's a way to make them better… I don't know, I'd probably say I'm quite open minded [to changeable intelligence]...	2 - Inc	Mixed (Inc bias)	Mixed
P3	I think children perceive themselves to be… thick or clever. Yeah. Erm… So, for example, 10 set 5 who I've just been teaching, who a lot of them, they resort to 'we're just thick' kind of 'what's the point?'. A lot of my teaching with them is about, getting them to understand that they don't have to do everything. So, for example, when we've been looking at some 10 mark questions this week, I've said to them, well at the moment we are all focusing on getting 5/10 for everything. If we get half marks on everything, that's a pass… So… Whether it's right or wrong it does affect how you approach conversations with kids. Doesn't it?	2.25 - Mixed (Inc bias)	Inc	Mixed
P4	Not a chance do I believe in that (fixed). Nope. (laughs) that's just, I genuinely think that that is just absolute nonsense. There's no other way of saying it.. I think it's just ridiculous this idea that you are born... you can only possibly learn so much. No you aren't, because you can keep on learning and growing and develop. Like my dad years ago, they had like night school on, near to where I live. And he just went off and started learning Spanish…and that's like a bloke in his 50s!	1.25 - Inc	Inc	Mixed
P5	I don't think it's fixed [intelligence]. Erm... And I also think it's not linear. As in its just going to keep going, I think it can if you're determined. But I think you have peaks and troughs. So when you have targets, and when they have to reach that by the time they're 16, obviously that is my role… And I'm paid to sing to the hymn sheet. But on the other side I do see them as individuals and I'm like 'she's not going to meet that'… Do I think she's never going to meet it? I think she could do it she wanted to, but we've only got a year. I know sometimes what I am saying and what I do actually believe clash, massively.	1 - Inc	Inc	Mixed

P6	I think it's changeable. You can't…you can't…really put a measure on someone's intelligence. It can change factors and what they have around them and what they do in school... [On factors which can change] probably their home lives, the encouragement from home. And anywhere else they might access encouragement as well. I think...	2 - Inc	Inc	Mixed
P7	Yeah, erm. I think it can be developed. Because from, myself. Not to do with the kids, I will always say to the kids it's never ever too late to develop your own intelligence...I genuinely think that it is, that, if you find the right thing to spend your time with - I think you can become very intelligent. I'm not saying that everyone can be a dentist - or a pilot, or a doctor. Because I think we've all got different stamina. We're only fitted into something for a very short period of time, like teaching for me, is that for my whole life? I don't know. We'll see how long I can last. But I genuinely think that you're not… born...you know, stupid or intelligent. I just think that your environment is a very big importance. In that situation. I think if you've got the right environment in school or the right environment at home and your conduct and attitude in school, is good. Then I think you can pick up as much as you want.	1.5 - Inc	Inc	Mixed
P8	I personally think it can be changed… you can be trained to be intelligent. And it's what you do with the information and how you ensure it does stick and that's all to do with metacognitive brain. In terms of being able to know what to do with the information and if you can remember the information. In terms of being able to know what to do with the information and if you can remember the information. So I think that's…like I know my highest ability student, does absorb the information and is very good at articulating it.	3.25 - Mixed (entity bias)	Inc	Mixed
P9	I feel like you can enhance somebody's education and you can teach them skills so that they can problem solve. So in that way I feel education can enhance somebodies intelligence. But in terms of you natural ability… there are some, and I do think generally speaking a smaller class size or tuition or one to one, I can say until I'm blue in the face 'do you get it' and.. At the end of the day it's my job to make sure you get it, so... this is not problem for me. I believe them we can improve their progress or understanding. But in terms of their natural talent, raw talent. I'm not sure. There are just sometimes where they don't get I and they can't do it and it's too hard. Being able to answer a question. I can teach them that and they can get it. But… in terms of their being able to get something first time. I think that's more fixed	3.25 - Mixed (entity bias)	Entity	Mixed
P10	No, I think like… I think it takes time. But… you can develop the process, but it takes consistency and strategies. So like, I suppose it's a bit like when you practice a skill, eventually you'll get better at it. Sometimes, what teachers fall short of doing, is teaching. To a specification or teaching to an exam board. So those dance students they should hopefully get better at answering their 12 mark responses. But that's because I will just drill into them a structure. And that, I don't think is a measure of their intelligence – that is a measure of how well they've just remembered the structure. So I think you can build on students' abilities to apply knowledge, but I don't know whether you can change their…core…intelligence.	3.25 - Mixed (entity bias)	Entity	Mixed

Exploring data further, by triangulating self-reports, interview data and recorded observations, it was possible to gain further insight into teacher beliefs, beyond self-report questionnaire intelligence measures. Therefore, presenting and capturing the nuances of teacher's beliefs of intelligence. The results indicated that there were five matches between self-report and stated belief (P1, P4, P5, P6, P7), while five teachers stated beliefs did not match with self-reports (P2, P3, P8, P9, P10). Responses which did match, between self-reports and interviews, were all incremental theorists. While four of the five teachers whose self-reports and interviews responses did not match were mixed believers. P2, self-reported a strong incremental belief (2) however provided a mixed belief verbal response, with incremental bias. While P3, self-reported a mixed belief with incremental bias (2.25), but verbally expressed a strong incremental belief. In addition, P9 and P10 self-reported mixed beliefs with entity bias (3.25), expressed entity beliefs in interviews. P8 self-reporting 3.25, however, expressed incremental beliefs in the interviews.

Results from both self-reports and interviews highlight those self-reporting mixed beliefs do not always match their verbal response. However, in accordance with current theory, those individuals holding mixed beliefs may respond to environmental cues, as teachers may be primed by their environment to act in accordance with their incremental environment (Yeager et al., 2019). Consequently, is it expected that those teachers expressing mixed beliefs may report either belief, incremental or entity, irrespective of bias. Although little research has investigated how context primes belief.

On the whole, the data indicated teacher intelligence beliefs were complex. Teacher interview responses encompassed a subjective understanding of the definition of intelligence, what constitutes as intelligence, as well as providing examples to support their beliefs (discussed in the section which follows). Furthermore, teachers displayed mixed intelligence feedback within their recorded lessons (observations), therefore, did not always match their stated or self-reported belief, as also reported in RQ1 (Section 5.1).

Findings here suggest that those holding strong incremental theories of intelligence are able to express their beliefs explicitly (e.g., in interviews), whilst those holding mixed theories, with an entity bias, may be more likely to hold entity beliefs. Although research suggests the teacher population may be concerned with social desirability (Song, 2018), thus less likely to report entity theories of intelligence, participants of the current study were able to express their entity beliefs explicitly. However, irrespective of stated beliefs and self-reports, teachers did not always enact their beliefs in their intelligence feedback.

Results indicate there are limitations of self-reports, which measure intelligence theories. Comparing teachers' self-reports and interview stated beliefs from this study, indicates teachers may not always self-report their intelligence theories accurately. Given these findings, it is recommended that more research is undertaken into appropriate measures of teacher intelligence theories. Particularly if researchers continue to explore teacher intelligence theories and teacher practices. Additional research would be useful to further understand teacher beliefs of intelligence, and more data is necessary to explore some of the discrepancies between self-reported beliefs and stated beliefs.

6.1.4 Teacher Definitions of Intelligence

As well as expressing their intelligence beliefs in interviews, teachers were asked to define intelligence. The purpose of asking teachers this was to, again, further understand teacher conceptualisations of intelligence, as well as explore nuances highlighted by others (see 2.9 and 6.1 for details). Previous research suggests incremental and entity theorists define intelligence in the same way (Dweck, 1999). However, others argue lack of clarity in definitions of terms or fail to address the nature of intelligence (Lüftenegger & Chen, 2017). Furthermore, teacher intelligence definitions in relation to theories of intelligence have not been explored.

Within interviews teachers were asked to provide their definition of intelligence. Data from this question were analysed thematically and inductively (see Sections 3.14.1 and 3.14.3), with similarities and differences drawn between teachers. However, answers contributed to the hypothesised model, through the second phase of analysis with AGT, which included all data (see Section 3.13.2). Excerpts of teacher definitions are presented below:

> *I suppose it would be someone who, so our more successful students, who we consider to have that creative intellect. They are problem solvers, they are thinking outside the box, they are willing to try new and different media. And experiment' (P6 – Inc self-report)*

> *Whereas the kids that are in here that are very good at art and intelligent in art… wouldn't be academically smart, because usually to me they're better with their hands and they're better with their… with doing things, and they're more creative, and they're more voiced, than the academic children. – (P2 – Inc self-report)*

> *He really wants to do well and he wants to move up in sets and he'll try his best to try and get there (P1 – Inc self-report)*
>
> *Intelligence to me is can you apply that knowledge, can you put that in another situation. They don't get it spot on, but they show they can use that then fantastic, spot on – (P5 – Inc self-report)*
>
> *To me I think an intelligent student will go out and use their initiative. To look up information, prior to the class... They won't just wait until the lesson to see that information the first time. To me I don't think intelligence is just down to their...how much they absorb the information, it's also what they do with the information. And it's a bit more… proactive (P8 – Mixed self-report)*

Data indicated that all teachers held differing definitions of intelligence, but with common categories across definitions. All teachers highlighted that intelligence existed across various domains and was multi-layered, including traits, effort, academic outcomes and ability. Common categories were identified, where teachers expressed there was not one definition of intelligence. Intelligence existed in various domains, including social, emotional and academic (e.g., intelligence in verbal and written responses to tasks set). Teachers also identified traits of intelligent students, for example hard-working, focused and motivated. Some teachers stated that they believed their students also had predetermined beliefs about intelligence, which were predominately fixed, in their opinion, which would in turn affect student motivation in class. Teachers' also stated they believed students beliefs about their own intelligence (e.g., incremental or entity) were affected as a result of setting, external factors (e.g., home life, social background and experiences in school) and target grades.

There were, however, differences of traits between teachers of creative subjects (P2 Art teacher, P6 Art teacher & P7 Music teacher). These teachers shared commonalities with other teachers of creative subjects (e.g., social, emotional and academic intelligences), also identifying that their most creative students were not necessarily the highest achievers academically. Instead, teachers of creative subjects noted additional traits in their intelligent students. For example, P2 stated their Art students were "more creative and more voiced than academic students", while P6 identified that set 6 students (e.g., lowest ability in traditional subjects, including English, Maths and Science) were "in comparison to the rest of the school…amazing at art". Furthermore, teachers of creative students described their students as problem solvers, resilient and creative. Indicating that creative subject teachers held differing conceptions of intelligence, as specific to their subject. Thus, when exploring the data it was suggestive that teacher's conceptualisations of the nature of intelligence were more complex than "fixed" or "growth". Whilst also embedded in further beliefs about the nature of intelligence.

Teacher Conceptualisations of Intelligence

Both the complexity of results (e.g., teacher beliefs embedded in beliefs about students own beliefs), and teachers variations in intelligence conceptualisations, were identified as potential issues for theories of intelligence. For instance, as teacher intelligence definitions varied, the congruence of intelligence beliefs and intelligence feedback practices could also differ – dependant on how teachers' conceptualise intelligence. Previous research has suggested many types of intelligence (Furnham, 2014) (e.g., multiple intelligences, fluid intelligence and 'g' intelligence), while other researchers in theories of intelligence have avoided the exploration of intelligence conceptualisation in theories of intelligence (Song, 2018) (see Section 2.9). Furthermore, research has suggested theories of intelligence may be better understood as knowledge structures (Anderson, 1995). Knowledge structures are what individuals know about the world around them, and can guide the individuals' perceptual and inferential. Under knowledge structures, theories of intelligence are guided by direct and indirect experience. Considering theories of intelligence as a knowledge structure, whether entity or incremental beliefs, may account for non-alignment between intelligence belief and intelligence feedback. As an individual's concept of intelligence affect actions and behaviour (e.g., teacher feedback), including automatic/intuitive response and planned/reasoned response (ibid).

Taking a knowledge structure approach in the study of theories of intelligence would be of benefit, as failure to examine intelligence definitions in line with individual conceptions is highlighted as an issue in theories of intelligence research (Lüftenegger & Chen, 2017). It was therefore important in this thesis to gain additional insight into teachers' beliefs of intelligence, if their intelligence beliefs were being measured, as opposed to avoiding this all together. The current study therefore measured beliefs through both self-reports and teacher conceptualisations of intelligence in interviews, comparing data to incremental and entity categories (e.g., alignment of stated belief and self-report). Data from this study indicated that that teacher intelligence belief may be more complex than fixed or growth. Further research in the area of teacher intelligence conceptualisation and intelligence as a knowledge structure may assist with better measurement of teacher intelligence belief and intelligence feedback.

Consequently, in naturalist classroom scenarios the data suggests teachers' theories of intelligence are interwoven with many other beliefs (e.g., student beliefs, beliefs about academic performance, measurement of intelligence) and individual definitions of intelligence. This finding is in line with Buehl and Beck's (2014) ecology model, which presents teacher practice as influenced by multiple factors (internal and external). When combining teachers' self-reported intelligence theories, stated beliefs and classroom behaviours, data highlighted that there was non-alignment across data. Thus, suggesting intelligence beliefs and non-alignment within the classroom are, on the whole, affected by other internal and external factors. The findings presented above (Sections 6.1.2 – 6.1.4), as well as data presented across RQ1 – RQ3 (Sections 5.1 – 5.3) were used to underpin the model presented in 6.2.

6.1.5 Other Beliefs

There were many beliefs identified by teachers which varied, for example, in relation to individual students (e.g., concepts of a good or bad student). However, all teachers gave responses which were in consideration of a student centered approach (e.g., feedback based on the individual pupil). Teachers indicated they expected more or less from pupils based on what they knew of the individual, teacher-student relationships and prior experience.

Furthermore, teachers held wider beliefs about individual classes, as a whole. Such as beliefs about the effort of classes, class sets, student behaviour and standard of work completed on the whole. Teachers' discussed class groupings and assigned attributes to classes (e.g., lazy, hard-working, low-ability, high-ability and poor student behaviour), which in turn, teachers' stated, affected how they interacted with classes (e.g., more or less praise, reprimands and scaffolding). Participant 1 identified changes within her practice based on a combination of lower ability pupils and her beliefs about the social issues associated with lower set students, describing her interactions with students of lower sets as "mumsey".

Participant 3 shared similar beliefs regarding differing practice for certain classes, with lower and higher sets. P3 described students in year 10 set 5 (lowest set) as holding preconceptions about their own beliefs, which she was attempting to challenge through instilling hard work, scaffolding (e.g., rephrasing questions) and working collaboratively. As a result of this approach, P3's year 10 set 5 class was willing to work hard to improve their work. Although P3 did identify that, overall, she held lower expectations for lower ability classes and believed she should not. In contrast, P3's top set year 10 class (highest ability) were not willing to work as hard as set 5 (lowest ability), as she stated students think "I'm, in set 1 and I'm the best at everything", which was not the case. P3 also described her top set classes as being "cocky", for being in top set, which altered her approach to teaching. She believed top set students needed to "get down off [their] pedestal and work a little harder", and indicated she was more conscious of reminding students of top steps to work harder.

Consequently, the data highlighted teachers' intelligence feedback were influenced by their wider beliefs about students. In some instances, teachers' wider beliefs about students accounted for the non-alignment between their intelligence belief and feedback. For example, teachers not challenging pupils because they believed it would hinder the learning process of the entire class (P7), or praising students more based on their knowledge of students having additional needs (P5). The role of 'other beliefs' was a key element in the degree of enactment of teacher intelligence beliefs, affecting the alignment of teachers' theories of intelligence and intelligence feedback.

6.2 Hypothesised Model Presentation

Given the data yielded and discussed above, alongside the findings of Chapter 5 and previous research (Chapter 2), this section aims to explore the mechanism of teacher intelligence beliefs and teacher intelligence practice. Specifically, why teacher intelligence belief and intelligence feedback may be misaligned, as identified in RQ1 (Section 5.1). The work presented in the current Section (6.2) is underpinned by key theories (e.g., teacher ecology, dual-processing and belief-system), which are linked to teacher enactment or non-alignment of beliefs in feedback practice (Sections 6.2.3 – 6.2.7) (e.g., context influencing decision making, Buehl & Beck, 2014). Literature was also identified to integrate and underpin categories which arose across the data yielded, outside the research questions and analysed retroductively (see Section 3.14.3). Given the identified categories from AGT, literature in this Section (6.2) is a combination of previously identified research (Chapter 2), as well as new literature in light of findings, which underpins the hypothesised model of this Doctoral study. The hypothesised model of the current study draws upon key theories and data, in order to explore the processes between beliefs and practice, where limited research exists in the field of theories of intelligence (Buehl & Beck, 2014; Fives & Gill 2014; Haimovitz & Dweck 2017).

There were several key categories that emerged from data which appeared to influence practice, including teacher ecology (Buehl & Beck, 2014), the belief system (encompassing various beliefs) (Fives & Buehl, 2012), proximal processes/triadic reciprocity (Bandura, 1986; Bronfenbrenner, 2005) and dual processing (Bandura, 1986; Fazio, 1990). All of which prompted additional investigation in relation to current research. It is also important to note, again, researcher stance, which was integral across interpretations of data.

6.2.1 Relationship to Researcher's Stance: Reflexivity, Epistemology and Norm Circles

Given that the researcher's stance was identified as critical realism (3.2.1), a reflexive approach to theorisation of the model was taken, in order to explore the interpretation of data, as discussed in Section 3.2.2. The reflexive approach assisted with identifying areas which were related to constructs within teacher's environments, for example the role of intelligence in schools (e.g., academic versus creative). Furthermore, teacher constructs were interpreted by the researcher, and so it was important to ensure objective analysis was attempted. Attempts to achieve objectivity were made through the chosen methodology, using a coded framework, teacher attributions in interviews to underpin interpretation and findings, as well as providing transparency of analysis. Observations yielded data in line with identified behaviours from literature and behaviours external to literature (see Sections 3.10 and 3.11), which generated emergent categories when analysed across all teachers. The use of an iterative approach across the data analysis, specifically for AGT and retroductive analysis (see 3.14.3), also ensured that new categories were coded, until no new codes emerged.

Applying the researcher's critical realist approach provided basic assumptions surrounding knowledge structures and mechanisms. For instance the epistemological assumption that knowledge can be socially constructed within norm-circles (Blaikie, 2003; Elder-Vass, 2012). Behaviour is guided and exists in the three domains of empirical, actual and real (Raduescu

& Vessey, 2009), as well as the influence of context and situational factors, which may arise and affect behaviour (Pawson & Tilley, 1997). Identifying the above areas within the critical realist approach were key factors in determining the behaviour of individuals, according to the ontology and epistemology of the researcher. These areas were combined to propose a larger mechanistic system (e.g., the domain of the real) (Raduescu & Vessey, 2009) (see Section 6.2.8), which also included the role of teachers theories of intelligence, in light of data collected.

To reiterate, the critical realist underpinning of the current research study aimed to go beyond the empirically observed events. Notably, as the critical realist lens proposes that events (e.g., teacher intelligence feedback) may only be actualised dependent on other factors, such as the individual, prior events and context (Raduescu & Vessey, 2009). Consequently, it was critical realism which underpinned the researchers' selection of theories (see 6.2.3 – 6.2.7), which were drawn upon alongside empirical data, to present the hypothetical model in 6.2.8.

6.2.3 Belief System

As noted earlier, the literature highlights that the belief system of teachers' plays a vital role in their guiding of feedback (Buehl & Beck, 2014; Buehl & Fives, 2009; Fives & Buehl, 2012; Pajares, 1992) (see Section 2.3 for full review). To summarise, for the purposes of the hypothesised model, the belief system can be understood in relation to centrality, whereby some beliefs are more salient than others. Thus, different beliefs may influence behaviour and guide decisions more than others (Posner et al 1982). For instance, strong beliefs maybe present with little evidence, although taken as factual knowledge and form a large aspect of an individual's identity. Examples of central, but unquestioned beliefs, include beliefs about an individual's parents (e.g., mother and father) and self-identity (e.g., male and female) (ibid). Beliefs can vary in their accessibility, in that individuals may be more likely to be aware of the role of their beliefs or not. Specifically, awareness can be referred to as the implicit (e.g., not considered by the individual) and explicit (e.g., awareness of belief) nature of beliefs in relation to behaviour (Fives & Buehl, 2012). Although, as mentioned (see 2.9) when discussing theories of intelligence, there can be misconceptions about the accessibility of beliefs. Again, for the purposes of this thesis, it is proposed that theories of intelligence are not implicit, given that they can be accessed through direct questioning and teachers can state them.

Furthermore, individuals accumulate evidence for their beliefs and exclude opposing evidence, which in turn can create bias within the overall system (Pajares, 1992). For example, believing a student's intelligence is fixed may result in a teacher having lower expectations and providing less challenge (Rissanen et al., 2018a). Consequently the assumptions within the hypothesised model align with previous research, which identifies:

- Beliefs vary in centrality and strength
- Beliefs vary within accessibility
- Knowledge and beliefs can be interwoven
- Beliefs are connected and affect behaviour

(Fives & Buehl, 2012; Pajares, 1992; Posner et al., 1982)

Taking the outlined assumptions above, in relation to the role of teacher intelligence beliefs in practice, beliefs can filter, frame and guide an individual (Fives & Buehl, 2012). Teachers may filter information they believe to be relevant and include or exclude this in their reasoning. A learner scenario (e.g., asking for help, failing on a task or being successful on a task), requiring a response, is framed once appropriate beliefs are filtered. The combination of beliefs filtering and framing scenarios, guides teacher's practice. The data from the current research reflects the underpinnings of the Fives and Buehl (2012) model, where it is a combination of beliefs which result in practice.

6.2.4 Ecology, Proximal Processes and Triadic Reciprocality

Within the teacher ecology (Buehl & Beck, 2014) an individual's behaviour and beliefs are guided by interactions across internal (e.g., beliefs and knowledge) and external (e.g., National Curriculum, Teacher Standards and class ability) factors. Within the ecological model, levels range from close proximity to the individual (e.g., internal beliefs) where direct interactions occur (e.g., immediate environment) through to external interactions where an individual is not directly involved with processes (e.g., Government policy). External factors play a large role in determining how an individual functions within a context (e.g., emphasis on core subjects, enhancing exam pressures on teachers, as noted by participant 3 – Section 4.7). Consequently, teacher beliefs and the formation of beliefs are influenced by the external factors of environment, as well as internal factors, such as previous knowledge.

Applying Bronfenbrenner's (2005) term 'proximal processes' can assist with our understanding of how individuals are shaped and shape their environment and beliefs.

Proximal processes exist within Bronfenbrenner's (ibid) child developmental model, however, can be applicable to teacher-environment-student interactions, as discussed (see Section 2.6). Proximal processes within the hypothesised model of this Doctoral research are understood as the occurrence of direct and regular contact with the immediate environment to the teacher (e.g., the school environment, including students and other staff). Teachers have direct and regular contact with classroom environments (e.g., learning environment), physical objects (e.g. room set-up, technology and resources) and others (e.g., students, staff and parents) (discussed in Section 2.6). The contact a teacher has with objects, others and their environmental influences teacher behaviour. For example, teachers in the current study identified they alter their intelligence feedback dependant on the student they are interacting with, or attempt to create 'fun' and 'relaxed' learning environments.

Proximal processes can also be related to 'triadic reciprocal processes', as proposed in Bandura's (1997) social cognitive theory. The three processes in social cognitive theory are behaviour (e.g., of the individual), environment (e.g., can increase the intensity and frequency of behaviour) and personal factors (e.g., personality and cognitive factors). Processes can involve the direct interaction between the individual and events, whereby the individual is influenced by the environment in a reciprocal manner. Consequently, relationships exists between the individual and the environment and can alter dependant on the situation. Across reciprocal interactions individuals are viewed as possessing the ability to change and shape the environment through their behaviours, with the emphasis on the individual controlling their own behaviour (Bembenutty, White, & Vélez, 2015). Important to the model of this Doctoral research is that individuals are shaped and guided by the immediate environment, therefore environment cannot be removed from beliefs and belief enactment.

6.2.5 Teacher Ecology

Within the work of Buehl and Beck (2014) (Section 2.6) the teacher ecology model relates to context specific internal and external factors which may hinder or support teachers' enactment of beliefs. For example, National factors (e.g., DfE policies) through to classroom factors (e.g., student behaviour). Internal and external factors are perceived by the individual, and therefore subject to individual differences, or identifiable from onlookers (e.g., researchers). The immediate environment, where teacher's experience direct interactions with students, are affected by proximal processes (Bronfenbrenner, 2005) and triadic reciprocal process (Bandura, 1977). The model presented in this Doctoral thesis proposes that all types of interactions, including proximal and triadic, have the potential to affect the intelligence feedback of teachers. Particularly as empirical data of this study evidenced the importance of context, where teachers cited their feedback practice was influenced by a student-centred approach, as well as situation-specific (see Sections 5.1 and 5.3).

In relation to phase two, AGT analysis (see Section 3.14.2), other beliefs of teachers were highlighted which affected the enactment of their beliefs. These ‘other’ beliefs about internal and external factors were also cited by teachers as affecting their practice. For example, P2 discussed student’s creativity and intelligence in interviews. Creative students according to P2 were:

> *Not very organised, [they] are skittish and don’t have a clue about anything but they’re amazing in this [art]… so… if it was an intelligent, intelligent kid… sometimes they just lack common sense*

From this statement, it was apparent that P2’s belief of intelligence was both a support, in terms of creativity and artistry, however a hindrance, when dealing with common sense issues, in the enactment of their intelligence belief. P2 had a clear concept of what was defined and valued as intelligence to them. Although noted that creativity was not ‘academically’ intelligent, leading them to question wider perceptions of intelligence in education and national polices. For instance, the introduction of the English Baccalaureate (Ebacc) in England, which measures progress of “core” academic subjects, considered essential for academic progress, and excludes arts subjects, as defined the Department for Education (Department for Education, 2019b). Therefore, teachers’ wider beliefs of education and culturally valued intelligence could hinder the enactment of their beliefs.

While it is recognised that there may be variation across internal and external factors (e.g., beliefs, subject and school context), categories from data were drawn upon from the data corpus. Most importantly, the hypothesised model presented in this Doctoral study processes within the broader ecology of teachers where the data collected indicated there were multiple factors which affected teacher feedback. Given that the teacher participants within this thesis were from differing schools (five in total), taught different subjects (six in total) and their years of experience varied (range 1.5 – 11 years), categories relating to ecology were identified through frequency in interviews. Across RQ3, categories were identified by the researcher which affected teacher intelligence feedback, such as relationships with student and prior knowledge of students (Section 5.3). However, categories which were not related to intelligence feedback, but teacher practice in general (e.g., role as a teacher), were also identified. Internal and external factors therefore include all researcher codes, which teachers stated in interviews as affecting their practice on the whole (e.g., motivation, strategy selection, interactions, task selection etc.), not limited to intelligence belief. Codes were identified, by teachers, as either hindrances, supports or both to teacher practice, however, categorised by the researcher (See Table 6.2).

Table 6.2 Teacher Identified Codes Affecting Practice

Hindrances to Practice	***Supports to Practice***	***Both***
• Student behaviour • Class size • Time constraints • Bad practice of others • Low motivation • Sets • Workload • Lack of support from senior leaders • Exams • Pre-determined grades • Data • Attendance • Limitations within role • Exam specification	• Own education • Remaining calm • Humour • Good rapport with students • Collaboration • High motivation • Fun • Relaxed • Student • Autonomy • Student independence • Classroom environment	• Confidence • Context of student • Effort • Expectations • Student Intelligence • Valued within role • Teacher-Parent Role • Personal vs Professional conflict • Relationships with students • Student home life • School policy • Relationships with parents • Impact of teacher

Furthermore, codes were aggregated into the ecology headings presented by Buehl and Beck (2014), while code definitions are presented in Appendix 12. Given that the Buehl and Beck (2014) model is related to the US context, the terms of the model in this thesis are adapted in light of the English educational context. Notably, 'district' factors were excluded (e.g., these are policies which exist on state levels in the US; for full review see Buehl & Beck, 2014, pp. 76 - 79), although teachers in the current study did not cite local factors as affecting practice (e.g., allocation of funding). National factors (e.g., exam specifications and inspection requirements – see Section 2.8) were identified as most inaccessible to teachers although dictating and affecting their practice. For example, individual teacher's having little say in the formation of Teacher Standards. School polices were encompassed in 'school factors', including policies set within schools which affected teachers roles (e.g., marking policy and behaviour policy). School factors may have some input from teachers, although little influence. Whilst classroom factors are where the majority of interactions took place (e.g., interactions with students and classroom environments). All factors are important in teacher practice, however, direct influence in a scenario is predominately influenced by the immediate environment, for instance student requiring assistance and teacher responds. The table (6.3) below present a selection of codes related to the areas outlined within the Buehl and Beck (2014) model.

Table 6.3 Areas of Codes - In Line with Ecology Model (Buehl & Beck, 2014)

National	***School***	***Classroom***
• Exam pressures • Specifications • Education Policy • Expectations – social and academic • Workload • Funding	• Grades • Setting • Staff Collaboration • Class size • Behaviour policy • Support • Autonomy • Data • Expectations of teachers/students • Attendance • Demographics • Location • Ethos	• Enjoyment in role • Students • Classroom environment • Relationships • Expectations of students • Context of student • Student home life • Attendance • Ability • Behaviour

The aggregated codes, which were presented under the Buehl and Beck (2014) headings here, were useful in identifying which codes were larger categories affecting practice amongst teachers. From the data analysis, teachers most frequency discussed classroom (e.g., students behaviour, effort and student-teacher relationships) and school (e.g. ability groups, expectations from senior leaders and grades) dynamics as affecting their practice, however acknowledged that national influences (e.g., progress, league tables and changes to GCSE specifications) were driving their roles as educators.

Given that teachers highlighted a number of factors which affected their practice, as well as their reflections on their own theories of intelligence, it was apparent that the wider teacher ecology was embedded within teacher practice. Data highlighted that theories of intelligence were part of a multitude of factors affecting teacher intelligence practice, rather than individual influence some researchers have previously suggested (Haimovitz & Dweck, 2017; Song, 2018; Sun, 2015). As identified in other belief research and a key findings of this research, the wider ecology of teachers is interrelated and affects teacher practice (see Section 5.3) (Fives & Gill, 2014a; Levin, 2014; Olafson et al., 2014).

6.2.6 School Profiles and Collective Beliefs

This section briefly explores school profiles (Appendix 9), as context is overarching factor of teacher ecology (e.g., the school environment, inclusive of demographics and school ethos). Each school context varied in location, ethos, and had contrasting demographics and academic outcomes on the whole (e.g., GCSE results). Profiles are outlined in this section to provide the reader with an overview of the schools included in this Doctoral study.

Progress in schools is measured by Progress 8, where results are compared to the achievements of pupils with similar prior attainment (Department for Education, 2016; National Statistics, 2020). Progress 8 is used as an indicator of school progress comparatively across England, with a score of well above/above average, average or well below/below average. OfSted results indicate the overall teaching learning (see Section 2.8). An overview of the schools within this study is presented below, at the time of data collection (Table 6.4):

Table 6.4 School Profiles

School	*Location*	*Type*	*Pupils*	*OfSted*	*Progress 8*	*Ethos*	*Participants*
1	Small town/Rural	Academy	648	Good	Average (0.08)	• Community, resilience, challenge • High standard, expectations and behaviour • Develop a growth mindset	• P1, P2, P3
2	Inner City	Voluntary Aided school	848	Good	Above Average (0.49)	• Community, compassion • Respect for others • Strong academic achievement • Development of whole person • Nurture talent	• P4, P4, P6
3	Large Town	Academy Sponsor	848	Good	Average (-0.02)	• Dedication and commitment • High expectations and achievement • Independent learners • I can, I do and I will be	• P7
4	Inner City	Academy Sponsor	671	Inadequate	Well below average (-0.97)	• Education, nurture & empower • Positive behaviour policy • Work hard and achieve • Forward thinking • Culture of challenge	• P8, P10
5	Large town	Academy Converter	1390	Good	Average (-0.13)	• Positive behaviour and relationships • Challenge for all • Collaboration • Happy • Independence and resilience	• P9

Three schools (Schools 1, 3 and 5) within this Doctoral study were considered ‘average’ in their progress 8, one school was ‘well above average’ (School 2) and one school was ‘well below average’ (School 4). Four schools were judged to be ‘Good’ (Schools 1, 2, 3 and 5) and one school ‘inadequate’ (School 4) by OfSted. Pupil size ranged from 671 – 1390.

Collective Beliefs

Despite the differences in school context, as identified in Appendix 9, what was apparent across all interviews and all teaching (from observations) were teachers’ approach to the development of learning and knowledge despite self-reported theory of intelligence (see RQ1, Section 5.1). Across all observations teachers appeared to be guiding learning and responding to learning scenarios within their classrooms, however, teachers expressed similar beliefs in interviews where there were more than one teacher from same schools

(Schools 1, 2 and 4 – see Table 48). Thus suggesting school context developed and guided some collective beliefs through norm circles (see 6.2.1) and elements of teacher practice (e.g., interaction with students, response to failure and praise).

For instance, in school 1, teachers expressed beliefs about the role of setting, for teachers where students were set on academic ability (e.g., English) (P1 and P3). Participants from school 1 also expressed strong beliefs about changing their approach to teaching, dependant on classes. Furthermore, P1 – P3 held strong beliefs about the role of behaviour in their school, and citied poor behaviour as a hindrance to their teaching, a key aspect of the schools' ethos. All participants from school 1 also expressed strong beliefs about social issues of students affecting various elements of teaching, identifying "its [poor behaviour] more a home or social issue" (P1), "praise is really important…you don't know what they're facing at home" (P2) and "social and behavioural factors affect it [intelligence] as well" (P3). Furthermore, school 1 held an ethos of developing a 'growth mindset', and all teachers expressed incremental beliefs within interviews and on self-reports (see Section 6.1.3 and Table 6.1).

Participants in school 2 (P3 - P6) expressed beliefs about instilling 'confidence' in their students. P3 – P6 stated developing confidence in their students would result in students being able to overcome challenges and therefore further progress, as opposed to giving up. As well as developing the individual as a whole, reflective of the school's overarching ethos (see Table 48). With reference to confidence, teachers from school 2 stated, "that's [challenge] a battle with their confidence more than anything" (P4), "if they've got confidence they're willing to try and willing to learn" (P5), and "it [using teaching strategies incorrectly] can be really detrimental to their confidence" (P6).

In the final school, with more than one participant sampled (School 4 - P8 and P10), teachers identified the importance of the continued processional development (CPD) they had received in school, which had affected their practice. Both P8 and P10 gave examples of how they had applied CPD techniques to their teacher, and suggested that CPD played a large role in their teaching. P8 stated "I've been marking more of an effort not to do that" referring to her classroom management, as a result of CPD. P10 stated similar, noting "I've been trailing... strategies with that group" as a result of CPD.

Despite some differences in school ethos, overall, it appeared that all schools included and teachers involved in the current study, encompassed wider values and practices associated with incremental theories of intelligence. Such as stressing the importance of learning, developing intelligence and promoting hard-work. Therefore, some incremental feedback and approaches may be embedded within English school culture, as well as the roles of teacher on the whole (Department for Education, 2017, 2019d). For example, using scaffolding strategies to differentiate learning and questioning techniques to challenge students (see Section 3.10 and 3.11), which is an important element of the teaching standards in England (Department for Education, 2011). Data also suggested that teachers enacted in accordance with collective beliefs in school. Collective beliefs appear to be important in teacher practice, as also noted in previous research by Song (2015). Further research into the beliefs of multiple teachers in the same school, and also across subjects, would be therefore useful. Such research may provide an understanding to differentiate where teachers' implement their own or collective beliefs in practice and how, or if, these relate to theories of intelligence.

6.2.7 Dual-processing: Conscious versus Unconscious Feedback

When explicitly asked about feedback (i.e., intelligence and motivational), teachers were not always aware of their behaviour. For example, when reflecting on entity language, P2 noted their labelling of a student "idiot boy" as it "just slips out". P5 also identified that their feedback was usually just out of "habit", as well as P3 who stated they did not "consciously realise" they were providing entity feedback. Other teachers identified that elements of their feedback were consciously deliberated, such as P7 actively being aware of providing positive feedback, and P4 noting her repetition of neutral language (e.g., okay and yes). Research indicates teachers may not always be aware of their feedback (Flitcroft, Woods, & Putwain, 2017), therefore in belief research dual processing models may assist with understanding of conscious vs unconscious feedback through exploring systems associated with information and response processing.

Within the cognitive dual-processing system model of attitudes, individuals process information through two systems (Fazio, 1990). The type 1 system is responsible for an individual's auto-response which is intuitive, fast and unconscious processing. In opposition, the type 2 system is reflective, rationalised, slow and conscious processing (ibid). Research has applied dual-processing specifically to the attitude-behaviour relationship, measuring initial response times to problems or cues, as a form of data collection (Pennycook et al., 2015). For the purposes of the hypothesised model, associated with the current PhD study (Figure 6.1), only the dual-processing theory was taken for application, excluding the methodology. The dual-processing theory was drawn upon to underpin teacher verbalisations in interviews, where teacher attributions for their own behaviour were aligned with dual-processing systems (e.g., type 1 – unconscious or type 2 - conscious) (ibid).

There are two arguments for the processes which occur within the dual-processing models in relation to beliefs (Trippas, Thompson, & Handley, 2017). These are identified as *default-interventionist* (e.g., belief bias triggers a type 1 logical response) and *parallel-processing model* (e.g., type 1 belief response and type 2 logical responses occur in parallel). Research indicates that beliefs and logic can be as a result of either type of process (e.g., beliefs can function as a type 2 deliberated process), however, it is the complexity of the problem which determines the overall process (ibid).

Despite the debate surrounding exact mechanisms, bias has been noted regardless of the type of processes (1 or 2) and therefore response is shaped by individuals' beliefs (op. cit). The degree of deliberation is determined by a combination of teacher knowledge of a situation, and the conflict of a situation with their beliefs. For example, if a teacher processes a situation where there is no belief conflict and they have experienced a scenario previously (e.g., feedback to a student they have knowledge of) they will draw upon a type 1 intuitive response. If there is conflict (e.g., student is not working as hard as expected) the response may be type 2, where teachers deliberate feedback before responding. Intelligence feedback to students may be a combination of conscious versus unconscious, as situational dependant, whilst also in response to previous knowledge of a situation or student. Therefore, dual processing is useful in further understanding why there is non-alignment between stated intelligence belief and teacher intelligence feedback, as found in RQ1 (see Section 5.1).

6.2.8 Hypothesised Model of Teachers' Intelligence Beliefs and Intelligence Feedback

The model presented in Figure 6.1 is underpinned by the data presented across Chapter 5, as well as the abbreviated grounded theory approach analysis, to explore further themes (e.g., termed 'categories' in AGT) outside the scope of the original research questions (see Sections 5.1 – 5.3). Notably, the model is presented in line with a critical realist approach, drawing upon Pawson & Tilley's (1997) model presented in 3.2.1. When applying the critical realist philosophy to the current research, the aim was to understand the role of intelligence beliefs (a proposed mechanism – no. 1 in the model), on practice (outcome – no. 2 in the model), which may be contingent and conditional on the school context and/or internal and external factors (no. 3 in the model). Drawing upon research outlined in previous sections (see Sections 6.2.3 – 6.2.7) and combining data from the current thesis (Chapter 5), this section explores the hypothesised model.

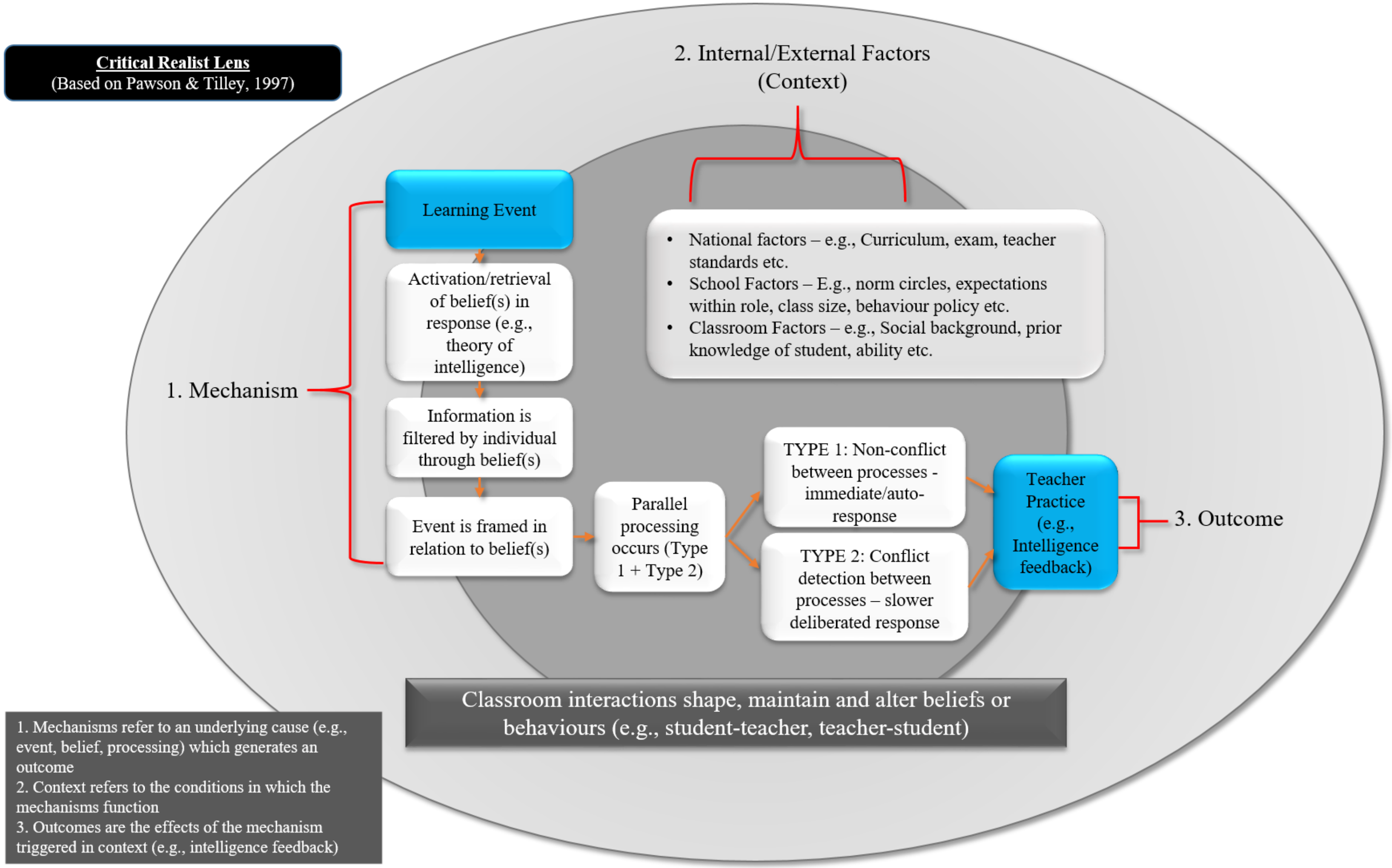

Figure 6.1 Theories of Intelligence – A Hypothesised Model of Teachers' Intelligence Beliefs and Intelligence Feedback (e.g., practice)

Within the model, it is proposed that teacher practice is guided by learner events as discussed in Sections 2.2.1 and 2.4. Learner events encompass all elements of learning which may require teacher feedback, whether these are failures, successes or students requiring assistance for development of work. Therefore, learner events are vital for receiving feedback from teachers, which in turn aims to progress learning (Ruiz-Primo & Brookhart, 2018). The learning event activates teacher beliefs, which may or may not include intelligence beliefs. The learning event, and subsequent teacher response, is guided by the activated beliefs. The activation and framing process may guide the teacher practice (Fives & Buehl, 2012). At this stage, the parallel process of type 1 and type 2 dual processing is activated (Trippas et al., 2017). If there is no conflict between the belief and situation, the teacher will act in accordance with type 1, and therefore not consciously. If there is conflict, and the teacher has little experience of a scenario or a teacher belief is conflicting with the scenario, there will be a process of conscious deliberation as to how to respond (Fazio, 1990).

External to the process above are the factors which may hinder or support teacher practice, and influence teacher practice, as identified by teachers in 6.2.5. Teacher identified external factors in the current Doctoral study, included exams, class size, predetermined target grades, student behaviour, class support, student background etc. (for a full list, see 6.2.5). Additional internal factors, which were teacher identified as affecting their practice, included beliefs about student effort, student ability, role as teacher and taking a student centred approach to feedback. Furthermore, teacher intelligence beliefs and teacher intelligence feedback may be reciprocal, dependant on the outcome and experience gained from a situation. For example, if a teacher provides entity intelligence feedback (e.g., "well done for getting full marks" - praising for the outcomes/performance) (Mueller & Dweck, 1998), which socialises an entity theory of intelligence, and a student reacts positively in the short-term, the teacher may continue to provide the same feedback. However, a teacher may change their practice if they have knowledge of the student, for instance providing less feedback if they are more able and more feedback if they are less able. The mechanism (e.g., individual cognitive mechanisms which lead to the outcome) and outcome (e.g., intelligence feedback) is affected by the immediate interactions of the teacher, student and context (Bandura, 1986; Bronfenbrenner, 2005).

Consequently, in relation to RQ1 (see 5.1) which indicated teacher intelligence belief and intelligence feedback were not always aligned; the hypothesised model aims to account for discrepancies between intelligence belief and intelligence feedback. For example, in a situation, which is situation specific, teachers may not draw upon intelligence beliefs, as other beliefs about students are more central (e.g., beliefs about previous effort and student background). Furthermore, there were additional factors which teachers identified as affecting their intelligence practice (see Sections 5.2 and 5.3). The most prominent theme across teacher responses in interviews was knowledge of individual students, which affected teacher intelligence feedback and teachers taking a student centred approach to intelligence feedback. Teachers identified they changed frequency or type of feedback, dependant on their previous interactions with students. Implying their beliefs of intelligence were small part of a wider network of beliefs, which interacted, to result in intelligence feedback.

Consequently, the hypothesised model combines theories of ecology, belief framing, immediate interactions and dual-processing as guiding teacher intelligence feedback and practice. Both the data of this Doctoral study, and literature which underpins the model, conclude that intelligence beliefs do not strongly guide teacher intelligence feedback (e.g., holding an incremental beliefs results in incremental intelligence feedback). Rather it is a combination of beliefs (e.g., beliefs about students, motivation, intelligence and expectations) and the mechanisms of beliefs (e.g., filtering, framing and processing) which guide teacher intelligence feedback in naturalistic scenarios (see Figure 6.1).

6.3 Recommendations of the Hypothesised Model of Teacher Intelligence Beliefs and Teacher Intelligence Practice

The hypothesised model presented in Section 6.2.8 counters the pre-existing model proposed by Haimovitz and Dweck (2017), which appears to be too simplistic due to the pathway of intelligence beliefs and theory of motivation (e.g., incremental belief results in incremental behavior). Importantly, there are other beliefs which have not been included in the model presented in this thesis (Section 6.2) (such as emotion, teacher self-efficacy and view of competence) however, literature identifies the important role beliefs play in teacher practice (Buehl & Beck, 2014; Fives & Gill, 2014a; Levin, 2014; Schraw & Olafson, 2014; Skott, 2014). A recommendation of this Doctoral study would be to undertake analysis with a larger sample of Secondary School teachers, given that the current study was undertaken with a sample of ten participants across five schools. A larger sample would beneficial to further explore teacher intelligence beliefs and intelligence feedback, particularly as there were a number of self-report mixed believers (*n* = 4), who expressed different beliefs to their self-reported beliefs. Furthermore, additional data would be useful in exploring the effects of new policies and cultural changes on teacher practice.

The current PhD study was guided by research which examines teacher belief and practice (Buehl & Beck, 2014; Fives & Buehl, 2012). Findings highlighted non-alignment of intelligence beliefs and intelligence feedback (e.g., practice), suggesting intelligence beliefs are not always salient to intelligence feedback. It was also identified, in the current PhD study, that there was influence of teacher norm circles (e.g., beliefs about student groups) on feedback, and teachers also discussed their attitudes towards students (e.g., positive and negative judgement) (Fabriger, MacDonald & Wegner, 2005). Both norm circles and attitudes were outlined by teachers in interviews. It is therefore acknowledged that there is further scope to explore the hypothesised model of belief-practice (in Figure 6.1) in relation to norm circles and attitudes, as these were not the focus of the current PhD study.

6.4 Chapter Summary

Overall, given the results of this Doctoral research, the previously proposed influence of theories of intelligence on teacher intelligence feedback is questionable (Haimovitz & Dweck, 2017). This is important as schools have undertaken professional development which advocates for intelligence belief change, in an attempt to influence teacher intelligence feedback to improve student academic outcomes (Foliano et al., 2019). Data from this Doctoral thesis suggests that the intelligence belief-intelligence feedback relationship of teachers is influenced by larger structures (e.g., national curriculum, professional role and school context) as well as other beliefs (e.g., beliefs about students, how best to motivate individuals and intelligence as a concept) and automatic versus rationalised processing of situations (e.g., motivational language and praise feedback) (as outlined Section 6.2).

This Chapter outlined findings from the phase two data analysis, which applied abbreviated grounded theory (Section 3.14.2). The analysis revealed multiple-findings which were used to underpin a hypothesised model of teachers' intelligence feedback and enactment of intelligence beliefs. The model in Section 6.2 was also proposed in order to account for the non-alignment between teacher intelligence belief and teacher intelligence feedback, as informed by RQ1 (Section 5.1) and teacher identified internal and external factors affecting practice in RQ3. The findings and model of Chapter 6 contribute to the wider literature through providing a detailed understanding of teacher enactment of intelligence feedback, as well as an insight of teaching from a teacher perspective through presenting teacher attributions for intelligence feedback (Chapter 2). Thus, the research of this Doctoral study is both applicable and meaningful to teacher's real-life scenarios and can be used to better understand influences on teacher intelligence feedback (e.g., context). The next Chapter (7) summarises the entire body of work in this Doctoral thesis, as well as providing further recommendations in light of overall findings.

Chapter 7

Conclusion

Introduction

Chapter 7 is the final chapter of this Doctoral thesis. Within this Chapter a summary of the findings is presented, alongside the identification of the wider contributions and significance to research that this thesis provides. Recommendations for future research are outlined, based on findings and limitations of this Doctoral study.

7.1 Thesis Summary

This study investigated the relationship of teachers' theories of intelligence and their intelligence feedback, focusing on the intelligence belief-intelligence feedback relationship. Previous research, as presented in Chapter 2 (Section 2.2), suggests teachers' theories of intelligence are important antecedents to their intelligence feedback practices (e.g., praise, application of strategies and goal structures) (Dweck, 1999; Haimovitz & Dweck, 2017), however limited research has explored the extent of the intelligence belief-intelligence feedback relationship in-situ (Rissanen et al, 2018a). Researchers have also argued that teacher use of intelligence feedback socialises intelligence beliefs to students, and can prime or maintain student beliefs of intelligence (Haimovitz & Dweck, 2017). For example, a teacher fails to provide more difficult work for high achieving students (e.g., labelled as 'naturally talented' students), with little opportunity for challenge. This may result in higher achieving students experiencing fewer failures (see Section 3.10), therefore, socialising an entity theory through limited challenge and minimal opportunities to persevere and attain higher academic outcomes. In the above scenario, the student is primed towards an entity theory of intelligence, which reinforces student 'natural talent'. As a result, teachers' intelligence feedback influences learner motivation and attributions for success and failure positively or negatively, dependent on the types of intelligence feedback they provide to their students.

In addition, students' theories of intelligence have previously been aligned with self-regulatory and academic outcomes, for example more positive for incremental theorists (e.g., increased effort and higher grades) and negative for entity theorists (e.g., non-persistence when failing) (Blackwell et al., 2007). As learner intelligence beliefs and learner outcomes are aligned (e.g., incremental belief increases effort when challenged, resulting in higher academic outcomes) and teachers can socialise theories of intelligence through intelligence feedback, researchers have sought to investigate the role of teachers' intelligence beliefs on teacher practice (Haimovitz & Dweck, 2017; Rissanen et al., 2019a). To date, the relationship of teachers' intelligence beliefs have been explored in relation to teacher learning environments (Cianci, Schubroeck & McGill, 2010), praise feedback (Cimpian et al. 2007; Gunderson et al., 2013; Kamins & Dweck, 1999), strategy suggestions (Rattan, Good & Dweck, 2012), response to failure (Snyder et al., 2016; Rissanen et al., 2019) and use of challenge (Gutshall, 2016). However, there is a gap in research, which combines the study of the various types of intelligence feedback, identified above. Intelligence feedback is commonly associated with entity and incremental practices (Fraeyman, 2020; Rissanen et al., 2019, Song, 2018 & Sun, 2015), proposing two distinct types of intelligence feedback. Entity intelligence feedback is concerned with teacher's emphases on the person (e.g., "you are clever"), whereas incremental intelligence feedback emphasises the process (e.g., "you have worked hard") (Haimovitz & Dweck, 2017). Consequently, the teacher intelligence belief-intelligence feedback relationship is identified as an important area of focus for researchers (see Section 2.1), given the role teachers play in priming, maintaining and socialising intelligence beliefs to students.

The work of this thesis was informed by Dweck's (1999) implicit theory of intelligence (Dweck et al., 2017; Dweck & Yeager, 2019; Yeager et al., 2019), the teacher ecology model of Buehl & Beck (2014), and the extant teacher belief literature concerned with the formation, maintenance and role of teachers' beliefs on practice (Fives & Gill, 2014a; Levin, 2014; Olafson et al., 2014; Schraw & Olafson, 2014; Skott, 2014). The Doctoral study aimed to explore secondary school teachers' theories of intelligence in their naturalist classroom environment, where there is limited knowledge, due to an overreliance on quantitative research, which lacks depth and richness of data and does not represent teachers' in-situ (Lüftenegger, 2017). Furthermore, the literature in England has focused, for the most part, on primary school settings (Foliano et al., 2019; Rienzo et al., 2015), presenting a further gap in understanding the role of secondary school teachers' theories of intelligence in practice.

Critical Realist Researcher Positioning

The thesis was underpinned by the researcher's critical realist positioning (see Section 3.2.1) (Alvesson & Skoldberg, 2009; Bhaskar, 2008; Raduescu & Vessey, 2009). Critical realism was identified as an important foundation throughout the Doctoral work, as teachers' experiential events were viewed through the three domains of the real, actual and empirical. The domain of the empirical is related to the observable experiences of teachers by onlookers (e.g., the researcher), measured through the observations and interviews of this thesis. The actual domain is both observed and unobserved, with the unobservable found in the mechanisms of the belief system, causing events and behaviour (e.g., teachers' beliefs on practice). However, attempts can be made to measure the unobservable through gaining insight via interviews, which provide some understanding into individuals' lived experiences through explication of beliefs and thoughts. The domain of the real pertains to the structures (e.g., context) and mechanisms (e.g., teacher belief framing decision-making) that can generate events, which influenced the researcher to consider the wider teacher ecology (Buehl & Beck, 2014). The layered approach of real, actual and empirical is termed an "ontological depth" (Blaikie, 2007, p. 84) (see Section 3.2 for details). Approaching research through a critical realist lens, therefore, framed the understanding and interpretation of data. The critical realist approach influenced the researcher to go beyond empirically observed events and consider how teachers' context and the mechanisms of teachers' beliefs affected their practice (Raduescu & Vessey, 2009).

Methods of data collection were achieved through a procedure of Dweck's (1999) self-report to measure teachers' theory of intelligence, one video recorded lesson per-teacher which captured teachers' in-situ intelligence feedback and one stimulated recall interview (STR) for each teacher to discuss attributions for their intelligence feedback (Section 3.7), providing the opportunity to explore teacher attributions for behaviour. A total of ten secondary school teachers took part in the study. Data were analysed in a two phase approach, consisting of thematic analysis for phase one (Section 3.14.1) and abbreviated grounded theory for phase two (3.14.2).

7.2 Findings

There were three research questions (RQ) associated with the Doctoral study, the sections which follow present key findings of the RQs, as well as outlining the significance and implications of findings from each of the RQs.

7.2.1 Research Question 1 Findings

Do teachers' theories of intelligence correspond with their intelligence feedback; if so in what ways?

In the measurement of intelligence beliefs through self-reports, six participants endorsed high incremental theories of intelligence, reporting a score of 1-2 on the theory of intelligence questionnaire (see Claro et al., 2016). Four participants were categorised as mixed believers, reporting an aggregated score between 2.1 and 4.9. One mixed believer was bias toward an incremental theory of intelligence, scoring 1.25. While three mixed believers were bias toward an entity theory of intelligence, all scoring 3.25. No participants reported strong entity beliefs, a score of 5 or above, and there was no alignment between scores and subject taught.

Exploring self-reports in comparison to observational intelligence feedback all teachers within this Doctoral study, irrespective of self-report, engaged in both entity and incremental feedback in-situ. Teachers self-reporting mixed beliefs, regardless of incremental or entity bias, also made statements about actively choosing to display incremental practices (e.g., creation of mastery scenarios for development of knowledge) and engaged in incremental practices (e.g., incremental process praise). Overall, all teachers' intelligence beliefs and intelligence feedback were non-aligned, indicating intelligence beliefs were not salient to intelligence feedback.

Furthermore, findings highlighted that there were more uses of incremental feedback, comparatively to entity, from nine of the ten participants - regardless of stated belief. Combining teacher observation data of all entity and incremental practices, 81% of all intelligence feedback was incremental in comparison to 19% entity. Incremental intelligence feedback was most frequent in teacher use of challenge (e.g., providing scaffolded questioning) and strategy feedback (e.g., strategies to overcome learner difficulties in tasks). Concluding RQ1, findings indicated that teachers' theories of intelligence do not always correspond with their intelligence feedback.

Significance and Implications of RQ1

The findings of RQ1 are significant and unique in a number of ways. To the researcher's knowledge, there is no research which has been undertaken in English secondary schools with teachers that is similar to this study (e.g., use of methods and participants). Therefore, data on the chosen sample of participants provides new understanding in exploring intelligence beliefs and intelligence feedback in naturalistic settings. Findings indicated that teacher theories of intelligence play a limited role on teacher's intelligence feedback, as teacher's intelligence beliefs were non-aligned with their intelligence feedback.

Researchers have attempted to change teacher intelligence beliefs, with the aim of altering practice, in order to promote teacher socialisation of incremental beliefs (Dweck, 2020; Dweck, 1999; Haimovitz & Dweck, 2017; Murrone & Gynther, 1991; Schmidt, 2015; Song, 2018; Yeager et al., 2019). However, the findings of this thesis highlight that teachers' intelligence beliefs may not be useful to target in an attempt to alter practice, as teachers already holding strong incremental intelligence displayed incremental and entity beliefs. Furthermore, in interviews teachers identified that they believed there were other beliefs which guided their practice (e.g., beliefs about individual students), to be discussed (see Sections 7.1.2 and 7.1.3). Overall teachers' intelligence beliefs and intelligence practice were not consistently aligned with practice, therefore providing new evidence on the relationship of theories of intelligence and intelligence feedback in England.

In addition, this research study used pre-existing literature to form an observation framework to code teacher intelligence feedback, which has not been undertaken in previous studies (see Section 3.10 and 3.11). Observational data presented in this thesis is novel as teacher intelligence feedback were coded extensively through a new observational framework (Sections 3.10 and 3.11). Categories used in the observational framework were theoretically derived, as well as empirically informed from emergent observational data (e.g., the use of neutral feedback) (see Section 3.10 and 3.11**).** This Doctoral study investigated theories of intelligence using mixed-methods, which is a further significant contribution to the literature, given the extensive quantitative data which exists.

7.2.2 Research Question 2 Findings

What types of intelligence feedback do teachers' believe they socialise to students?

All teachers in this Doctoral study, irrespective of stated beliefs, identified that they aimed to align their teaching with incremental practices, providing 'positive' intelligence feedback to students. Achieved specifically through teachers' use of intelligence feedback. Data from interviews revealed that teachers' overarching beliefs were centred on learning, student progress and their role as a teacher (see Sections 5.2.1 and 5.2.2). Teachers identified that they aimed to motivate students through encouraging students' hard work, independent learning and positivity. Regardless of their own beliefs of intelligence, teachers were concerned with ensuring students could academically achieve and attempted to promote positive intelligence feedback (e.g., incremental). Positive feedback included attempting to motivate with praise, using humour, instilling confidence and feedback, which was based around knowledge of students.

Overall, observational and interview data indicated that teacher intelligence feedback was provided by considering the individual, including knowledge about prior learning, school data (e.g., pre-determined target grades) and social backgrounds of students. Therefore, teachers of this study took a student centered approach to pedagogy (see Section 5.3.5), considering the individual before providing intelligence feedback (whether consciously or unconsciously, see Section 6.2). This finding is different to current research and model of teachers' intelligence beliefs and intelligence feedback, which suggests teachers are guided by a combination of intelligence beliefs and beliefs about motivation (Haimovitz & Dweck, 2017). A student centred approach was further explored in answering RQ3 (see Section 7.1.3).

Despite teachers stating they aimed to be "positive" in their approach to intelligence feedback, there were times when teachers failed to provide incremental feedback. For instance, where teachers self-identified negative entity feedback to students (e.g., using "idiot boy" and "you're a clown" humorously). Teachers attributed their knowledge of the student and teacher-student relationships to their use of entity intelligence feedback. Data indicated that what teachers believed about their practice (e.g., that they used incremental feedback) and what teachers were observed to enact in their practice (e.g., that they used entity feedback), were non-aligned. Teachers were not always conscious of their feedback practices, as explored in Section 6.2.7 of this thesis.

Significance and Implications of RQ2

Answering RQ2 indicated teachers held beliefs about their own use of intelligence feedback. In interviews, beliefs about teachers' intelligence feedback were stated simply (e.g., "I aim to provide positive feedback"). However, when comparing interview data to observational data, the stated belief and observed intelligence feedback was non-aligned and complex for all teachers. For instance, a teacher states they provide positive intelligence feedback, however, in practice insinuates a student is lazy. In interviews all teachers stated they believed intelligence feedback was important in their teaching and learning. Intelligence feedback was identified by teachers as affecting student progress and motivation, and teachers also expressed it mattered what types of feedback students were provided with. Overall, teachers suggested they aimed to socialise incremental beliefs, which would be conductive to student learning and progress (Section 7.1.2). Although despite stated intentions, teachers failed to consistently provide incremental intelligence feedback in all lessons observed.

Given that findings of the current Doctoral study revealed that teacher beliefs about their feedback practices are non-aligned, there are implications for future research, which explores teacher beliefs (e.g., intelligence). Suggestions for researchers would be to use a combination of methodological approaches (e.g., observations, self-reports and interviews with stimulated recall), in order to fully explore and evaluate teacher beliefs and practice. Combing methods provides data, which can assess beliefs stated in interviews or self-reports, compared with belief actualisation, followed by teacher interpretation of their own behaviour. Providing insight into how beliefs may, or may not, be present in teacher naturalistic practice. A combination of approaches is recommended by researchers in teacher beliefs, and should therefore be a key consideration for future studies in teacher theories of intelligence (Fang, 1996; Olafson et al., 2014; Pajares, 1992; Schraw & Olafson, 2014).

While two studies have explored teacher beliefs about their use of intelligence feedback, through video recorded observations and stimulated recall in Finland (Rissanen et al. 2018a; 2019), this Doctoral study provides insight into English education, where seldom research exists. This is important in providing further understanding of the role of intelligence beliefs and context on use of intelligence feedback. Furthermore, the thesis provides a novel contribution to the literature through the inclusion of self-reports of intelligence, which are conceptually different to the gifted measure utilised in the work of Rissanen et al. (ibid) (see Section 3.10.3), alongside observations and stimulated recall interviews.

Using Dweck's (1999) theory of intelligence self-report provided useful comparative data to interview data, which captures verbalised belief. Overall, when comparing self-reports of intelligence to interview data about teachers' beliefs of their intelligence feedback, self-reported belief and stated belief were non-aligned for the three teachers self-reporting a bias entity mixed belief. However, when comparing all teacher self-reports of intelligence belief, to beliefs about teachers use of intelligence feedback and teacher intelligence feedback all teachers displayed mixed incremental and entity feedback, as reported in RQ1. This thesis therefore makes further recommendations for the inclusion of qualitative methods (e.g., interviews with stimulated recall opportunities and observations) in the application of theories of intelligence with the teacher populations (see Section 7.3), in order to further understand the non-alignment of intelligence beliefs and practice.

7.2.3 Research Question 3 Findings

What are teachers' beliefs about internal and external factors in relation to their intelligence feedback?

There were multiple factors that teachers identified as affecting their intelligence feedback, encompassed within additional beliefs about students and context. For instance, teachers' expressed strong views about situational factors (e.g., student behaviour and student background) which influenced teaching and learning, and as a consequence, affected teacher intelligence feedback to students (e.g., allowing students to do less challenging tasks). Most prevalent across interviews were teacher's statements about their student centered approach to intelligence feedback (RQ2). All teachers identified, in interviews, that responses to students and their use of intelligence feedback, was dependent on the student.

Furthermore, teachers identified "collective beliefs", where multiple teachers from the same school, highlighting commonalities in interviews (schools 1, 2 and 5). Collective beliefs in school 5 included teachers identifying that they were using strategies in line with newly suggested continued professional development techniques from senior leaders (e.g., metacognitive questioning). While all teachers in school 1 cited issues about student behaviour, which was a hindrance to their role, as they spent class time attempting to manage situations, as opposed to teaching. Finally, all teachers in school 2 identified that they were trying to instill confidence in their students, which was important to student progress and motivation, as would equip them with the ability to work through challenge and independently deal with set-backs. Consequently, this Doctoral thesis found that beliefs about students and school context influenced the enactment of teacher intelligence feedback.

Significance and Implications of RQ3

Findings from RQ3 present novel insights into the role of collective beliefs on teachers' theories of intelligence and their practice. RQ3 data highlighted teachers from the same school held collective beliefs about students and context (Section 6.2.6). As collective beliefs were identified in groups of teachers from the same schools in this Doctoral thesis, collective beliefs are an important consideration when further studying teacher samples, as there may be salient collective beliefs, which guide teacher intelligence feedback. For example, the collective belief of the importance of applying questioning strategies learned in CPD, which were aimed at challenging students through scaffolded questioning and, by nature, an incremental intelligence feedback. Furthermore, there were situational factors which teachers identified as affecting their intelligence feedback practices.

This is an important contribution to the literature as teachers' intelligence beliefs and intelligence feedback were influenced by the wider situational factors. To conclude, this research identified that internal (e.g., beliefs about students) and external (e.g., school context) factors play an important role in guiding and influencing teachers' intelligence feedback (see Section 7.3 for recommendations on this finding).

7.2.4 Findings from Abbreviated Grounded Theory and Hypothesised Model

In Chapter 6, various other findings were discovered, which existed external to answering the RQ's, however, were important in contributing to the literature on theories of intelligence. This section summarises the findings from the hypothesised model of teachers' theories of intelligence and intelligence feedback.

Self-Reports and Verbalised Beliefs

This thesis triangulated self-reports, interview data and recorded observations, which provided further insight into teacher intelligence beliefs, beyond using self-report questionnaire intelligence belief measures alone. Using a combination of self-reports and verbalised beliefs was chosen in order to provide corroboration between methods. Furthermore, self-reports are typically the main measure in theory of intelligence belief research (Dweck, 1999) and are identified as a limitation in belief research, as they do not capture the depth that is provided through qualitative methods (Olafson, 2014).

Comparing the self-reports of teachers of this study, to their interview responses about intelligence beliefs (see Section 6.1.3 for further details); five out of six teachers self-reporting strong incremental beliefs (scores of 1 – 2) verbally endorsed strong incremental beliefs in their verbalisations of intelligence beliefs, in interviews. While two out of three teachers expressing mixed beliefs, with entity bias, verbalised entity beliefs in interviews. However, there were two teachers whose self-reports did not match with their verbalisation of belief in interviews. Thus, eight out of the ten teachers self-reports and verbalised intelligence beliefs were aligned.

Definitions of Intelligence

While self-reports and verbalised intelligence beliefs in interviews matched for eight out of ten teachers, all teachers identified that there were multiple types of intelligence. Intelligence definitions included creative, social and academic, while there were intelligence definition differences between traditionally academic and creative teachers. Teachers of creative subjects (e.g., Music and Art) cited students who were viewed as less academic, by other teachers and staff, were more likely to be creatively intelligent. Creative intelligence was defined as encompassing problem solving, being 'hands-on' and students being imaginative thinkers. While teachers of traditional academic subjects (e.g., Maths and English) suggested their intelligent students were highly organised, concerned with academic results, researching external to lessons and proactive with their own learning.

Results indicated teacher's concepts of intelligence were more complex than a simple definition of 'intelligence', however, distinctly different across subjects. Notably, as teacher's understanding of intelligence encompassed many definitions. Findings therefore highlighted that teacher conceptualisations of the nature of intelligence were multiple (e.g., social intelligence, creative intelligence and academic intelligence). Theories of intelligence need to take into account that people hold different views about different types of intelligence, which in turn affects the measurement of intelligence beliefs.

Hypothesised Model of Intelligence Feedback

In order to account for the non-alignment of intelligence belief and intelligence feedback, a final contribution to the literature on theories of intelligence was presented in the hypothesised model in Chapter 6 (see Section 6.2.8 for the model). The model combines Buehl & Beck's (2014) teacher ecology, belief filter, framing and guiding of behaviour (Fives & Buehl, 2012), dual-processing (e.g., automatic vs. rationalised) (Fazio, 1991) and is embedded in Pawson & Tilley's (1997) critical realist lens (e.g., encompassing mechanism, context and outcome). The purpose of the model was to explore how the belief system (e.g., internal factor), teacher context (e.g., school) and processing of events guides teacher intelligence feedback and accounts for the non-alignment of intelligence belief and intelligence feedback, uncovered in RQ1.

The findings of this Doctoral study concluded that intelligence beliefs are non-aligned to teacher intelligence feedback (e.g., holding an incremental belief results in incremental intelligence feedback). Rather it is the combination of beliefs, including beliefs about students, school context and intelligence conceptualisation, as well as the mechanisms of beliefs (e.g., filtering, framing and processing), which guide teacher intelligence feedback in classroom settings. This finding is a significant contribution to the literature, as previous research proposes an alignment between intelligence belief, and teachers' motivational beliefs about student, as guiding intelligence feedback (Haimovitz & Dweck, 2017). The model developed in this thesis (Chapter 6) therefore suggests a new and novel way to understand and interpret the mechanisms, which affect intelligence feedback in naturalistic settings.

7.3 Recommendations for Future Research

Recommendations have been identified for future research. The purpose of this section is to present the reader with areas where additional research would be useful, based on the results and limitations of this thesis.

Intelligence Definitions

Given that teachers hold differing conceptions of intelligence (Section 6.1.4 and 7.1.4), it would be useful to further explore teacher concepts of intelligence in relation to different subject areas of teachers. This would be useful in identifying commonalities across subjects and domains (e.g., social, intellectual and creative intelligence), as data in this thesis indicated that there were differences between teachers of traditionally academic and creative subjects (Section 6.1.4).

While extensive research has been undertaken with the general population about the concept of intelligence (Bempechat, London, & Dweck, 1991; Good et al., 2012; Jonsson et al., 2012), further research into teachers' concepts of intelligence and theories of intelligence may be useful in understanding teacher feedback, and how definitions of intelligence relate to practice. For instance, teachers of creative subjects believe intelligent students are hands-on, not academically intelligent (e.g., in lower class sets), socially intelligent and problem solvers. While teachers of academic subjects believe intelligent students achieve high results, are in higher sets and are organised. As teachers define and evaluate intelligence differently, dependent on their subject, teacher concepts of intelligence may play an important role in their intelligence feedback and measurement of intelligent beliefs. Particularly as concepts of intelligence may influence teachers and their response to learner failure and challenge (e.g., teacher of academic subject does not value creative thinking, as has little use in their subject).

Teacher Interventions

Other researchers have argued that teacher interventions, which aim to alter teacher beliefs, and or practice, should include stimulated recall (Olafson et al., 2014; Pinter et al., 2015; Tripp & Rich, 2012). Stimulated recall provides teachers with evidence of their behaviours (e.g., negative intelligence feedback) which is shown to be a successful way to engage teachers in belief or behaviour changed (ibid). If teachers are prompted to reflect on their practice through stimulated recall and identify what behaviour may be maladaptive to learners, this process may lead to altered intelligence feedback which socialises incremental intelligence feedback and conductive to effort.

Furthermore, results of this thesis indicated that teachers were not always aware of their practice (Section 6.2.7). However, stimulated recall provided teachers with an opportunity to discuss their interpretations of their own intelligence feedback and provide reasons for their behaviour. Therefore, it would be of interest to researchers to implement STR as a means to change and explore teacher beliefs about their own behaviour and interactions with students, following the identification of additional salient teacher beliefs on intelligence practice.

Other Beliefs and Context

The results of the current Doctoral study indicate teacher intelligence feedback is influenced by a combination of internal factors (e.g., beliefs about students) and external factors (e.g., school context). As teachers' intelligence beliefs operate in a wider ecology (see Section 2.6 for literature and 6.2.5 for data), it is recommended that future research considers the wider implications of teachers' ecology. This is not a recommendation for the study of intelligence beliefs as a singular variable (e.g., intelligence belief correlating to intelligence feedback), as previous research has attempted (e.g., Haimovitz & Dweck, 2017). Rather a selection of multiple-teacher beliefs, which are encompassed in a larger network of internal (e.g., beliefs about students) and external factors (e.g., school context). School environment, school policy structures and student interactions all play a role in guiding teacher behaviour (Buehl & Beck, 2014). Therefore, the identification of salient beliefs affecting teacher intelligence feedback would be useful in enhancing teaching and learning (Fraeyman, 2020), in order to better target practice change.

Further research into the beliefs of multiple teachers in school would also be useful, as such research may provide an understanding how to differentiate where teachers' implement their own or collective beliefs in practice and how, or if, these relate to theories of intelligence. Reiterating previous research, it is suggested that researchers and schools consider the usefulness of Continued Professional Development (CPD) in relation to their individual context (e.g., student SES and school culture), including teachers and students (Basit, 2010; Yeager et al., 2019). Particularly as some theory of intelligence interventional CPD sessions have yielded no effect on student progress and motivation (see Section 2.2).

Measurement of Teacher Beliefs and Theories of Intelligence – Naturalist Environments

As identified in Section 7.1.1, the methodology of this study has seldom been used in other studies of intelligence beliefs and intelligence feedback. To date, and to the author's knowledge, only two papers have explored teachers' intelligence beliefs and practice using STR and semi-structured interviews (Rissanen et al., 2018a; 2019), although within these studies researchers opted to distribute a measure of giftedness, rather than intelligence. Given that teacher's beliefs about intelligence are complex and nuanced, researchers in the field of beliefs have recommended multiple methods to triangulate data, specifically to uncover the mechanisms of intelligence belief-intelligence feedback (e.g., stimulated recall, interviews and self-reports) (Fives & Buehl, 2014; Olafson, 2014).

While the papers by Rissanen et al. (2018a; 2019) provide some insight into teacher theory of intelligence and intelligence feedback practice using triangulated methods, at present there is still an overreliance on self-report measures only. The current Doctoral research, and the two aforementioned studies, which have explored teacher intelligence belief-intelligence feedback (ibid), have evidenced that self-reports are not always accurate in the measurement of teacher beliefs. In addition, a non-alignment between self-reports and stated beliefs (e.g., in interviews) was highlighted in RQ1, a recommendation for future researchers would be to explore teacher self-reports in relation to their beliefs verbalised in interviews (see Sections 2.3 for the nature of beliefs).

Finally, as previously recommended in the hypothesised model of belief and teacher feedback (Section 6.3, Figure 6.1), there is a further recommendation to explore teacher intelligence beliefs and attitudes. As beliefs form attitudes, it would be useful to investigate if teacher beliefs of intelligence shape teacher attitudes towards students (Fabriger, McDonald &

Wegner, 2005). Teacher participants identified positive and negative attitudes towards students in interviews, as coded (Appendix 12). However, as attitudes were not the focus of the study, there was limited exploration in the analysis of the current PhD study.

Larger Samples, Across Wider Contexts

Given that the current thesis included ten participants with an average age of 30.2 and no self-reporting entity theorists, recommendations for other researchers to undertake studies using the methodology of the current PhD research with a wider sample would be a useful contribution to the field (e.g., self-reports, observations and interviews). In particular additional sampling across English secondary schools, to gain further insight into teachers' theories of intelligence and intelligence feedback (e.g., with entity endorsing individuals).

While the current Doctoral thesis focused on teachers form secondary schools, teachers from various levels of education would also provide further evidence of the role of intelligence theories across education. Including teachers from primary education (ages 5 – 11 years) and Further Education (ages 16 – 19 years) would provide further insight into intelligence belief and intelligence feedback of teachers. There may be contextual factors and educational policies that alter teacher practice at different levels of education, which are not possible to evidence in secondary school teacher's contexts (e.g., quality and quantity of interactions).

7.4 Conclusion

It is long documented that the beliefs of teachers interact with their practice (Buehl & Beck, 2014; Kagan, 1992; Nespor, 1987; Pajares, 1992; Rissanen et al., 2018a; Rokeach, 1969). The data from the current study is in line with previous research, which highlights the complexities of teachers' beliefs, whilst also identifying that teacher intelligence beliefs are one of many beliefs that influence intelligence feedback (e.g., incremental theory will not always result in incremental practice) (Rissanen et al., 2018a; 2019).

While current research highlights that learner intelligence self-beliefs are aligned with self-regulation (e.g., motivation), and may be useful on an individual level for exploring learner self-regulation in learning scenarios (Dweck, 1999). The evidence within this Doctoral study indicates that this is not the case for teacher's in feedback, as teacher's theories of intelligence are influenced by multiple internal (e.g., beliefs) and external (e.g. school context) factors. Teachers' theories of intelligence are not always salient to intelligence feedback, particularly when accounting for other internal (e.g., beliefs about students) and external (e.g., context) factors. As this Doctoral thesis highlights, it is a multitude of factors, including wider school context, individual students and teacher-student relationships, which guide teacher intelligence feedback. Previous models, which indicate teacher intelligence belief correlates with teacher intelligence feedback (e.g., Haimovitz & Dweck, 2017), should be reviewed to account for the new findings of this research.

This Doctoral study presents unique findings in relation to theories of intelligence in multiple areas (see Sections 7.1.1 – 7.1.3). Findings indicated that all teachers of this study engaged with intelligence feedback which was reflective of their self-reported intelligence theory (e.g., incremental belief and incremental practice). There were, however, instances of feedback which were not reflective of self-reported intelligence beliefs. For example where teachers reported incremental belief, but engaged in an entity intelligence feedback practice. When questioning, in interviews, discrepancies between self-reports and observational intelligence feedback, teacher's attributed their intelligence feedback to additional beliefs, for instance beliefs about students and beliefs about school context.

To conclude, this Doctoral thesis identifies that teachers' theories of intelligence are complex and interwoven with other beliefs. Teachers within this Doctoral thesis attributed their intelligence feedback to their considerations about students as individuals and school and classroom contexts (Section 5.3.5). Consequently, if researchers and schools aim to further understand and improve the effectiveness of teacher intelligence feedback, they must pay particular attention to the role of school contexts and wider teacher beliefs about students and collective beliefs. Finally, research which explores the feedback of teachers, should include additional qualitative methods, in order to attain a deeper insight into teaching from a teachers' perspective (Nespor, 1987) and address wider nuances of teacher feedback in-situ, as highlighted across this Doctoral study.

7.5 Chapter Summary

Chapter 7 concludes the thesis, presenting an overview of the Doctoral research findings. The position of the researcher was revisited in order to provide the reader with an understanding of the researcher's ontology, epistemology and axiology which underpinned decision making. Findings from phase one and phase two of analysis were also summarised, with contributions to the literature reiterated. Recommendations were provided, in order to highlight further areas of focus for future research, which arose as a result of the findings of this Doctoral research. The penultimate section (7.4) of Chapter 7 concludes the thesis, reiterating the unique contribution to the literature that the Doctoral research has provided and identifies both the importance and implications of the research.

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