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**Teachers' Theories of Intelligence and
Instruction in English Secondary Education**

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Abstract

This paper explores the relationship of teachers' intelligence beliefs and classroom instruction, in particular teachers' use of intelligence language. According to Dweck's (1999) theory of intelligence, individuals can hold intelligence beliefs on a continuum from an entity theory, where intelligence is fixed, through to an incremental theory, with intelligence understood as malleable. Some research demonstrates congruence between teachers' beliefs and practice; for example, teacher intelligence beliefs and praise language (Lin-Siegler, Dweck & Cohen, 2016). Other findings, however, report incongruence between the belief-practice relationship, such as intelligence beliefs and use of challenge (Rissanen, Kuusisto, Hanhimäki & Tirri, 2018a). Consequently, this study aims to further understand teachers' belief-practice relationship in the classroom.

Pilot data were collected through mixed-methods, consisting of Dweck's (1999) intelligence theory questionnaire, video-recorded observations, and semi-structured interviews. Data were analysed using thematic analysis. Findings indicate that the belief-practice relationship is both congruent and incongruent; as teachers' intelligence beliefs are not always enacted during instruction. Rather, intelligence belief and practice may be mediated by other personal beliefs and contextual factors, such as pre-determined target grades, class sets (low, mid, high), beliefs about students and student behaviour; however additional evidence is required.

Keywords

Implicit Theories of Intelligence; intelligence; secondary education; belief; practice; teachers; motivation.

Context for the Study

According to Dweck (1999) individuals believe that intelligence is either fixed, with someone possessing a set amount (entity theory; also referred to as fixed mindset), or intelligence can be developed and grown over time (incremental theory; also referred to as a growth mindset). Studies have shown that students with stronger growth mindsets have higher academic attainment and increased motivation (Blackwell, 2007). Teachers can influence the intelligence beliefs of their students through the language used to praise, challenge, and motivate students (Rattan, Good & Dweck, 2012; Rissanen et al., 2018a). Given that teachers' are responsible for the development and progress of students (Department for Education, 2011) it would be preferable for teachers to engage in practices which lead to positive academic outcomes. Little is known, however, about how the language used by teachers in naturalistic classroom settings might convey to students different messages about the malleability of intelligence and how this relates to teachers' beliefs about intelligence. The present study addresses this gap in the literature by using a mixed methods study to examine the intelligence language used by three teachers, in one English secondary school. One lesson per teacher was video recorded, followed by a semi-structured interview to explore teachers' reflections on their own language and how these relate to teachers' own self-reported beliefs about malleability of intelligence.

Citation

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Socialisation of Intelligence Beliefs

It has long been suggested that intelligence beliefs are connected with wider beliefs, attitudes and emotion (Ying-yi et al., 1999). More specifically, research indicates that learner intelligence beliefs are correlated with their achievement goals, effort beliefs and attributions for failure (see Dweck, Elliot & Yeager, 2017). For example, growth beliefs correlate with a mastery goal, where the goal is to develop one's competence, whereas fixed beliefs correlate with performance goal, where the goal is to validate competence (see Dweck & Leggett, 1988). Teacher intelligence beliefs have also been shown to influence some areas of teacher instruction, such as use of praise (Rattan, Good & Dweck, 2012), achievement goal environment (e.g., performance or mastery classroom goal structure) (Shim, Cho & Cassady, 2013) and degree of learner autonomy (Leroy et al., 2007). Furthermore, research suggests that teachers' intelligence beliefs may shape their intelligence language, and consequently prime students' intelligence beliefs. For instance, teachers who believe intelligence is fixed have been documented as comforting students for failures (e.g., "it's okay, not everyone is good at this"). This socialises teachers' own fixed belief through communicating to the student that effort will make no difference to their ability (Rattan et al., 2012).

Further to this, Skipper and Douglas (2012) found that the type of feedback given to students impacted on their persistence when facing failure. Participants (primary school children and undergraduates) were required to read three scenarios about succeeding in educational tasks, followed by different types of feedback. Feedback relating to mindset was categorised as either process-praise, where language referenced the process (e.g., "well done you have worked hard"), or person-praise, relating to the individuals (e.g., "well done, you are clever"). This was followed by two additional reading scenarios, where students failed and were asked to report performance, affect and persistence. Results indicated that those learners receiving person-praise displayed more negative responses, particularly in performance and affect. In light of these findings, it was highlighted that person-praise is particularly detrimental to student success, through socialising a fixed mindset and therefore suggesting to the learner that intelligence is innate. The classroom achievement goals teachers create have also been linked to teacher- and student- intelligence beliefs (Lin-Siegler, Dweck & Cohen, 2016). These classroom achievement goals can either encourage students to achieve comparative to others (performance goals) or develop competence and make personal progress (mastery) (see Gunderson, et al., 2013). In turn, socialisation of intelligence beliefs during instruction can influence students' motivation, such as learners adopting a mastery goal and making additional effort when facing failure. Contrast to this, when students are encouraged by teachers to judge their achievement relative to peers, a fixed mindset is socialised. As a consequence, teachers' establishment of performance goal environments can result in poor student effort, when facing future failures (Rissanen et al., 2019).

Haimovitz and Dweck (2017) proposed a model of how teacher intelligence beliefs may function in relation to teacher intelligence language (see Figure 1). The model begins with an achievement event (success or failure). The achievement event can prompt either teachers' beliefs about intelligence, how to motivate students or a combination of both to determine the type of intelligence message relayed to the student about their achievement event (e.g. person or process praise). 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, are not discussed. 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 language. In a school, for instance, that has an overarching ethos of promoting hard work, the teacher may be more inclined to use process-orientated praise irrespective of their own intelligence belief (see Hargreaves, 1995). Recent research from Finland suggests that the enactment of teacher intelligence belief in the classroom is mediated by wider factors, such as culture (Rissanen, Kuusisto, Hanhimäki & Tirri, 2018b). For example, the prominent Finnish belief of taking care of the weakest was identified as influencing teachers' instruction.

Despite the findings of Rissanen et al. (2018b), little is understood about the process of teacher intelligence belief actualisation in the classroom in England. Thus, in the present study we further our understanding of the role of teachers' intelligence beliefs with regard to their practice, notably through the identification and examination of teacher attributions for their intelligence language in the classroom. For clarity and consistency, the study of teachers intelligence beliefs and their intelligence language are termed here as the 'belief-practice relationship' (see Buehl & Beck, 2014). In short, the study here is concerned with investigating the intelligence belief-practice relationship of teachers.

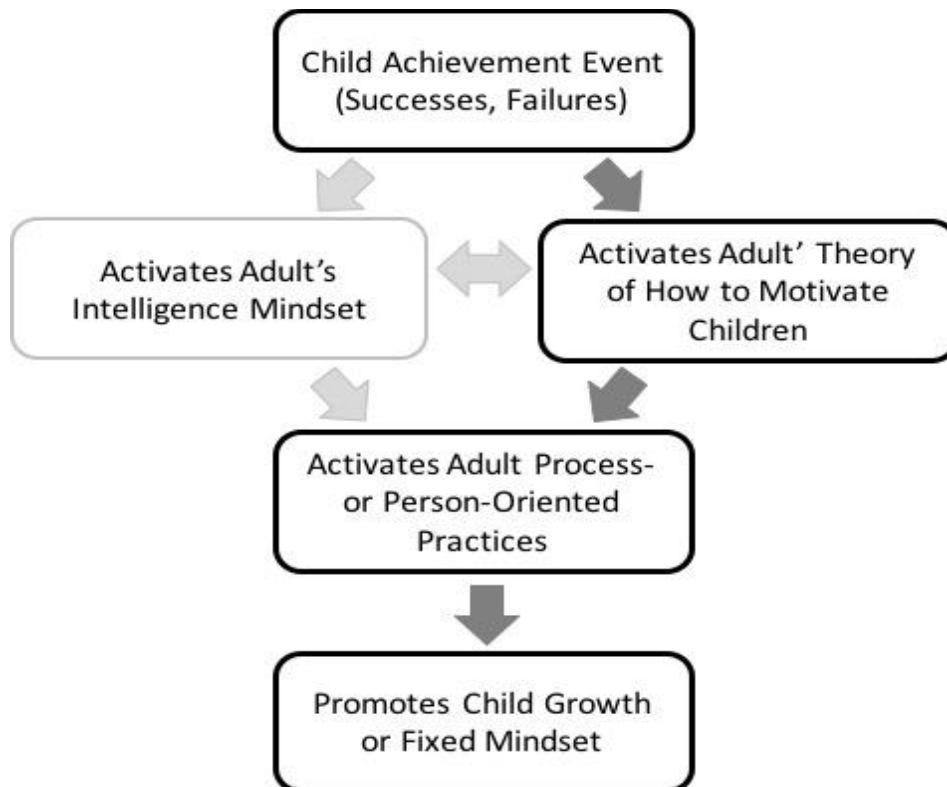


Figure 1. Hypothesised model for the socialisation of implicit theories of intelligence from teacher to pupil (reproduced from Haimovitz & Dweck, 2017, p. 1856, with permission).

Teacher Ecology Model

In line with previous research, beliefs are conceptualised as being one of several influences on teachers' instructional practice (see Pajares, 1992; Fang, 1996; Fives & Gill, 2014; Fives & Buehl, 2016). In the Buehl and Beck (2014) ecological model, the relationship between teacher beliefs and practices are influenced by internal (inherent to the teacher) and external (environmental) factors (see Figure 2). Influences of the internal and external factors on the belief-practice relationship are multiple, including, but not limited to, school ethos, experience, personal beliefs, educational policies and culture (Buehl & Beck, 2014). An example of this in England can be drawn from the seven teaching standards, collectively these standards outline the responsibilities of teachers (Department for Education, 2011). For instance, there may be a conflict between teaching standard seven (which is to manage behaviour in line with school policy) and personal belief, where the belief of the individual teacher is to manage children's behaviour in accordance with their personal belief, as opposed to school policy. Thus, the belief-practice relationship in the individual teacher can be influenced by broader environmental factors (Buehl & Beck, 2014).

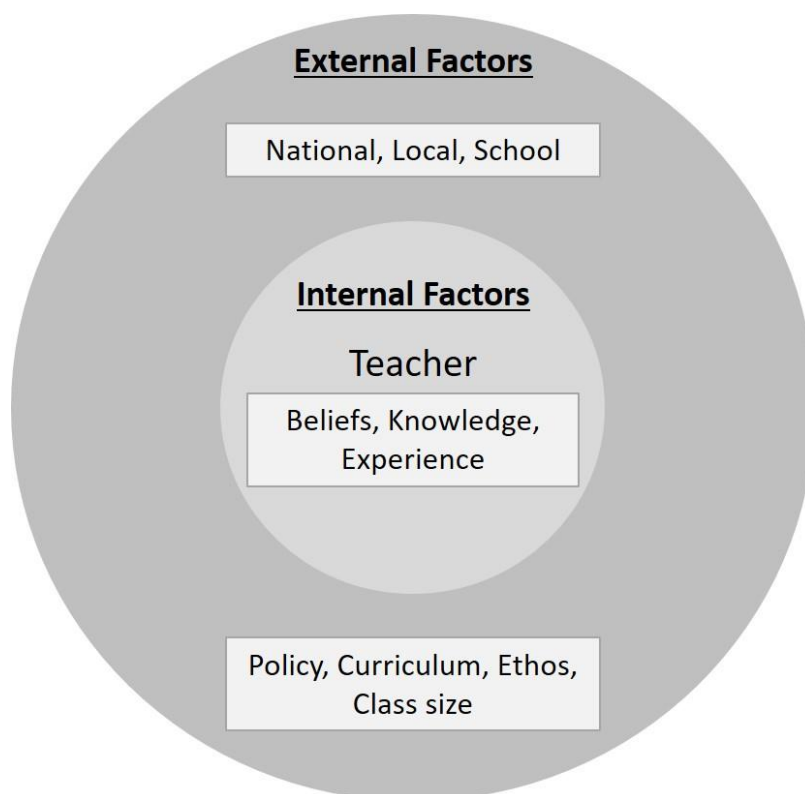


Figure 2. Teachers' system of internal and external factors (adapted from Buehl & Beck, 2014, p. 74).

Research Questions

The aim of the study was to examine the internal and external factors which may influence the belief-practice relationship, specifically as they pertain to teachers' use of intelligence language (personal beliefs about individual children, self-reflection, policies and school ethos). Teachers were asked to identify those internal and external factors that impacted on their instruction, when viewing segments of a video recorded lesson which related to intelligence language, as well as reflecting on their beliefs about intelligence. These findings will therefore contribute to our understanding of the belief-practice relationship, as it relates to intelligence beliefs and language. In order to understand potential influences on teachers' intelligence language in the classroom, the present study draws on the Buehl and Beck (2014) teacher ecology and Dweck's (1999) theory of intelligence belief. The research questions (RQs) surrounding this study are as follows:

1. Do teachers' theories of intelligence correspond with their instruction; if so in what ways?
2. What types of intelligence language do teachers believe they socialise to students?
3. What are teachers' beliefs about internal and external factors in relation to their intelligence language?

Methodology

A pilot study was undertaken in one school in England. Prior to the pilot taking place, the study was subject to ethical review by the author's University, and subsequently approved. The procedure included the administration of Dweck's (1999) implicit theory of intelligence questionnaire measure, one video recorded observation per teacher and one semi-structured interview per teacher. Three secondary school teachers volunteered (two English and one Art teacher), all of whom were female. Recruitment of teachers for the study was achieved through convenience sampling by targeting

participants most accessible to the research (Cohen, Manion & Morrison, 2011). Given the nature of this pilot work, it is important to note that the purpose of data collection at this stage was not to generalise; rather to test suitability of methods, as well as the extant literature, and gain some insight into the practice of these teachers (Rissanen et al., 2018b; Rissanen et al., 2018a; Rissanen et al., 2019).

Questionnaire data were collected with the purpose of providing a measure of teachers' self-reported intelligence beliefs. The questionnaire contained four entity items from Dweck's (1999) measure. Two versions of this questionnaire have been used in previous studies. One contains 8 items (4 fixed and 4 growth mindset) and the other contains 4 fixed items only. In the present study we used the version containing only the 4 fixed items. This decision was made in order to avoid the positive wording effect noted in recent literature. Individuals are said to be more likely to report a growth mindset, particularly among teachers who have engaged with mindset professional development in the past; notably as a result of social desirability (Yu & Kreijkes, 2017). Previous studies have also demonstrated validity and reliability, using the four growth item measure (De Castella, 2015). The purpose of the questionnaire was to gain a descriptive measurement of the teachers' intelligence beliefs. These self-reported intelligence beliefs were used as a point of reference, for relating to subsequent observation of the language used around intelligence in classrooms and teachers' reflection on these observations. These data were used to provide evidence for RQ1.

Video-recorded observations were undertaken (one lesson per teacher) in order to capture the types of intelligence language used in instruction. Observations provided a means to uncover the degree of belief enactment; as related to the previously completed intelligence belief questionnaire. Teacher behaviours were categorised as growth or fixed mindset using theoretically derived definitions (see Table 1 for examples). As specific teacher behaviours have been investigated individually, in relation to teacher intelligence beliefs (e.g., response to failure/errors, goal structure of tasks, use of praise/criticism and challenge of tasks), it was possible to compile an observation guide to assist with the categorisation process of teacher instruction (Kamins & Dweck, 1999; Mueller & Dweck, 1998; Rattan et al., 2012; Skipper & Douglas, 2015). Importantly, the observational video footage provided the opportunity for stimulated recall in the semi-structured interviews, where teachers reflected on their behaviour and decision making, whilst viewing events (Francis, Rapacki & Eker, 2014). These data were used to provide evidence for RQ2 and RQ3.

Table 1. Examples from the observation behaviour categorisation guide.

Behaviour	Example of Incremental theorist behaviour	Example of Entity theorist behaviour
Teacher response (feedback) to students' failure and errors	Encourages student despite failures or errors (e.g., student answers incorrectly, teacher uses as learning opportunity to explore and develop answer)	Reprimands student for errors or ignores them and moves on (e.g., no that's not the answer)
Type of praise feedback teacher gives to student, this can be pre, mid or post tasks	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 worked hard for this outcome)	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)
Use of language and tasks in relation to level of challenge (feedback/practice/activities)	Pupil is challenged, given scaffolding to consider or prompts to challenge higher thinking. (e.g., what do you think you need to do here?). Work is completed and additional challenging work is provided.	Pupil is given answer directly, with no option/support to consider in order to complete answer – prescriptive (e.g., this is the answer). Work is completed - student is not provided with a challenge.
General comments to students in relation to motivational language, on task vs. off-task (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 expects students to work hard and overcome challenges through hard work.	Teacher fails to make an effort to motivate students when struggling or off-task or teachers lowering expectations of students (e.g., hurry up, this is too hard for you so move on).

Semi-structured interviews provided the opportunity to discuss the events of the observation and beliefs of teachers in relation to their intelligence language (Wengraf, 2001). Segments of the video footage, relating to the observation codes, were played back to teachers in order to elicit stimulated recall with a less structured approach to questioning. Following the review and categorisation of video footage by the researcher, the interview allowed for the collection of data which covered specific topics in-depth (e.g., language, perceived context and beliefs) (Mears, 2012). Participant attributions for their intelligence language, as recorded in observations, was useful in further understanding their actualisation of intelligence beliefs during instruction. Participants were also questioned about their beliefs of intelligence directly to account for subjective understanding of intelligence, as well as triangulate with questionnaire and observational data.

Analysis

Data analysis of interview data was undertaken through thematic analysis (TA), with the overall purpose of identifying and reporting commonly occurring emergent themes (Braun & Clarke, 2006). Thematic analysis was chosen for flexibility, allowing for a hybrid-approach using inductive and deductive analysis (Fereday & Muir-Cochrane, 2006). A deductive approach was used to answer the RQs as underpinned by theory (see table 1). An inductive approach was used to highlight emergent themes, not previously identified in the literature, that were relevant to understanding the belief-practice relationship. Braun and Clarke (2006) provide theoretical and methodological guidance for TA through six-phases, as outlined below.

In the first phase of analysis, the researcher became familiar with the data through coding video observations and transcribing interviews. Using the theoretically derived coding scheme, observations yielded data to inform the interview process. Additional intelligence language was documented through identifying behaviours in observations, where intelligence language could not be coded according to the observational guide (e.g., neutral feedback). A summary of each observation was written in relation to the pre-determined codes, used for subsequent TA across all observations. Phases 2 and 3 of TA in interviews were completed through engaging with the data using the Nvivo software to categorise codes. The process of coding was then undertaken with all participant data, where codes and themes could be investigated further through comparison between participants interviews (phase 4). Analysis then took place on a larger scale, where the data corpus (questionnaires, observations and interviews) were analysed to consider relationships between teachers' self-reported belief, intelligence language in observations and teacher reflections (phase 4/5). The final procedure was the presentation of overall themes, which yielded inductive themes (phase 6). The process required the researcher to consider individual participant interviews and observational data in the first instance, yielding initial codes, before comparing all codes across participants to form overall themes and sub-themes; pertaining to RQ's and additional findings. Questionnaire data were used for identifying the belief-practice alignment; comparing themes, observational behaviours and interview attributions for behaviours.

Initial findings

Across the three teachers sampled, results indicated that two participants endorsed high growth mindsets (reporting a score of 5 or greater on the theory of intelligence questionnaire; see Claro, Paunesku & Dweck, 2016) and one participant was categorised as a mixed believer (reporting an aggregated score between 2.1 and 4.9 on the intelligence belief questionnaire). No participants reported strong fixed mindset beliefs (a score of 2 or below).

Participants endorsing a strong growth mindset displayed contrasting intelligence language, in individual observations. This was categorised as growth and fixed in accordance with the observational categorisation guide. For example, one teacher praised the class for hard work and promoted effort and persistence when faced with challenge (growth intelligence language). Later, in the same lesson, the teacher praised a group of students for speed of completion (fixed intelligence language). Praise for speed completion suggests if individuals can not complete tasks quickly they lack intelligence, as intelligence which is fixed and innate should be naturally occurring, rather than the result of effort (see Rattan et al., 2012; Snyder et al., 2014). The participant reporting a mixed mindset also displayed contrasting language, such as not providing challenge to students following work completion (fixed intelligence language), while encouraging persistence in some tasks (growth intelligence language). Contrasting behaviour of the mixed believer, however, is to be expected as these individuals do not endorse a strong fixed or growth belief. Consequently, as noted in previous literature (Dweck & Molden, 2007) they can display both types of growth and fixed behaviours.

In interviews teachers identified that beliefs about factors such as class-setting (low, mid, high ability), student behavior, senior management support and predetermined target grades can alter their intelligence language and instruction. In response to questions about intelligence beliefs and

intelligence language, teachers stated they consider the individual student's motivation, target grades, teacher-student relationship, social background and behaviour. Teacher three, for instance, said:

Matthew 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 language] more based on what I know of the child. Rather than their ability.

Teacher three described their use of intelligence language in accordance with their beliefs about the individual student, rather than their own intelligence belief. Table 2 presents additional quotations, where teachers identified other internal and external factors which affect instruction; not limited to intelligence language. Examples include professional development structures, class setting in school and beliefs about strategies to motivate student. To summarise, the findings of this study so far suggest other internal beliefs play a role in mediating the enactment of intelligence language (RQ3). Additional evidence of teacher identified internal and external factors from other schools is needed, however, given that this finding is from one school only.

Table 2. Teacher interview comments on factors.

Teacher	Comments on factors	Code
1 – Inc	[On teachers' use of intelligence language] 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.	<ul style="list-style-type: none"> • <i>Context</i> – Amount of work in school and other's 'having a go' • <i>Attribution for own behavior</i> – Responding in this way as a result of student • <i>Belief about Student</i> - Lazy
2 – Inc	I'm supposed to be starting this thing from my observation, where I'm supposed to go behind them and stand with my arms folded, but I feel like an idiot doing that, so I keep just going sh! And then maybe it'll click later... But I won't shout, I just won't do it.	<ul style="list-style-type: none"> • <i>Context</i> – Advice from others for professional development, does not align with personal beliefs • <i>Use of strategies to motivate</i> – beliefs about ways to motivate students (e.g., not shouting)
3 - Mixed	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...	<ul style="list-style-type: none"> • <i>Context</i> – Behaviour of students in school • <i>Ability level</i> – Role of setting in school • <i>Support</i> – levels of support within school/context

With reference to RQ1, preliminary findings suggest that teachers do not always actualise their self-reported theory of intelligence, through their intelligence language. Preliminary findings, rather, reveal that teachers' beliefs, as reported in questionnaires, are both congruent and incongruent across their practice. Various mediating internal and external factors were identified by teachers (see table 2) (e.g., student behaviour, professional development, beliefs about individual students and

motivational strategies). The initial findings here are similar to the current qualitative work of others, as it is also indicated in other studies that there is incongruence between teachers' intelligence beliefs and their instruction (Rissanen et al., 2018b). The data in this research study is, however, unique as this evidence presented is from an English school; while other research of this kind is from Finland (Rissanen et al., 2018b) and the US (Sun, 2015).

Across observations, there were particularly high uses of neutral feedback from all teachers. Neutral feedback here was identified and conveyed by teachers through the use of phrases such as "good, well done, keep it up" etc. Neutral feedback is not associated with a particular theory of intelligence, however, valanced positively (well done – positive and indicating the correct answer) or negatively (try again – negative and indicating an incorrect answer). Surveying the literature, neutral feedback was not accounted for in other studies surrounding theories of intelligence, rather, set up to be either fixed or growth only (Kamins & Dweck, 1999; Skipper & Douglas, 2012; Gutshall et al., 2013). Neutral feedback was described by teachers as primarily the result of automatic decisions, as opposed to rationalised (see table 3). The process of automatic versus rationalised feedback is therefore an area for further focus upon additional data collection.

Table 3. Teacher comments regarding neutral feedback.

Teacher	Comment on use of feedback	Code
1 - Inc	So like I'd probably say 'oh, well done lad!' and things like that... Like, 'oh yeah, that's really good!	<ul style="list-style-type: none"> • <i>Neutral praise</i> – Positive, although disassociated with theory of intelligence
2 - Inc	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.	<ul style="list-style-type: none"> • <i>Relationships with students</i> – Changes teachers interactions with individuals • <i>Reflections on practice</i> – Beliefs about own behavior and professional conduct
3 - Mixed	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... It's just like 'sh, sh' a little reminder to them to like pipe down, and then we carry on. I wouldn't say I thought about it.	<ul style="list-style-type: none"> • <i>Attributions for behaviour</i> - Environment in classroom • <i>Consciousness</i> - Conscious of thought process and practice • <i>Belief about how to motivate</i> – Small reminders

Limitations

A key limitation in the research presented here is the small sample size. Although previous research has included small sample sizes to explore research questions qualitatively (see Sun, 2015; Rissanen et al., 2018a; 2018b), with respect to the research reported here additional data will be subsequently collected. The purpose of this will be to explore data from other teachers and present themes from a broader selection of schools where internal and external factors may be different. It is also noted that there were no data from a teacher endorsing fixed mindset beliefs, limiting the discussion of

intelligence belief enactment to those reporting mixed or strong growth beliefs. Despite these limitations, the pilot provided an opportunity to deeply explore the rich data collected, through careful analysis, as a result of implementing the chosen qualitative methods and thematic analysis (Olafson, Grandy & Owens, 2014).

Conclusion

The findings of this pilot study indicate that the relationship of beliefs and practice is complex, and the processes which surround the enactment of beliefs include a multitude of factors. Keeping in mind limitations, the initial evidence here indicates intelligence belief does not always account for or guide teacher instruction; in particular teacher intelligence language (Rissanen et al., 2018b). More specifically our findings indicate, that teachers' instruction and intelligence language appears to fluctuate between fixed and growth, regardless of self-reported intelligence belief. Teachers expressed that contributing factors to their instruction was due to a combination of internal and external factors including, but not limited to, their beliefs about individual students, the nature of students' intelligence, roles as educators, the curriculum and student outcomes. Although additional data is required, it could be suggested that teachers' practice and subsequent language to students operate in accordance with a system where teachers' intelligence beliefs are just one factor; in addition to other internal and external factors (e.g., school, class size, students and role) (Rokeach, 1969; Buehl and Beck, 2014; Fives & Gill, 2014). From the evidence provided here, however, it is possible to attain a broader understanding of the unique internal and external factors which may mediate teacher instruction and their use of intelligence language (Nespor, 1987; Skott, 2014).

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