



Empowering teachers to implement a growth mindset

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ABSTRACT

Research evidences the benefit of students holding a growth mindset. There is also increasing recognition of the influence of teachers' beliefs on how students perceive their own abilities. Teacher and student beliefs are linked: despite this, there is sparse research investigating teacher mindsets. This research sought to evaluate training aimed at influencing teachers' mindsets and effecting practice change. A mixed methods design was employed. Six training sessions were conducted across two phases. Phase one consisted of an initial training session to 37 participants. Phase two consisted of five sessions attended by 17 participants. Results found a statistically significant shift between pre- and post-measures of mindset which was maintained after three months. Evaluation indicated increased participants' knowledge base and confidence. Key themes identified evidenced the impact of the training on sustained change to teacher mindset and practice. Limitations and implications for practice are considered.

KEYWORDS

Implicit theories; growth mindset; teacher change; teacher practice; implementation science; educational psychology

Introduction

The question of pedagogy, or how best children learn, has been studied for many centuries (Hattie, 2012). However, as research and knowledge advances there is an increasing need to find effective ways to apply theory to practice. Teachers are the bedrock of education: they are required not only to be experts in their content area but are also expected to be knowledgeable in child psychology, skilled in communication, execute classroom management strategies and navigate ever changing organisational and national politics (Beavers, 2011). Arguably, teachers are best placed to adopt and embed new concepts and effect systemic change. Scottish Government (2008) initiatives show an increasing recognition of well-being as central to planning in education. The Scottish Government (2015) is committed to exploring the effectiveness of a range of interventions aimed at reducing inequalities and promoting well-being. Implicit theories of intelligence (Dweck, 2000) may provide insight into how to support children and young people to reach their potential. Dweck (2000) used the term "growth mindset" to describe an individual's view that intelligence is malleable and can be developed. It is therefore posited that teachers who hold a growth mindset are able to support their students to consider their own mindset and to develop strategies which support their learning.

The current research seeks to investigate the impact of implicit theory training (Blackwell, Trzesniewski, & Dweck, 2007) on teacher mindset, subsequent practice and sustained change.

What are implicit theories, why do they matter, and can they be influenced?

Recently there has been increasing recognition of the importance of how an individual perceives themselves and how this impacts their actions (Dornyei, 2009). The way in which an individual constructs meaning about themselves plays a determining role in their development. Research indicates mastery and helpless responses to learning are linked to an individual's self-belief (Möller, Pohlmann, Köller, & Marsh, 2009). Thus, in order to truly understand motivation to learn, it is important to firstly understand self-belief.

Implicit theories or self-theories relate to an individual's view about their basic qualities (Dweck, 2000), such as intelligence or personality. These can be defined as schematic knowledge structures which an individual implicitly holds about their attributes. The implicit theory of intelligence (Dweck, 2000) refers to an individual's belief towards whether they can change their abilities and intelligence.

Dweck (2000) argued that there are two distinct ways in which intelligence may be viewed: incremental or entity. Individuals with an entity, or fixed mindset, view intelligence as unchanging; whereas those with an incremental or growth mindset view intelligence as something which can develop.

Dweck maintains that an individual gravitates to either end of the dyad of mindset, that is, a fixed or growth mindset. Individuals holding a fixed view create distinctive frameworks (schema) for responding to academic tasks in the form of cognition, affect and behaviours. These are rooted in past experiences and reinforcement history, and influence whether an individual predicts success or failure towards future tasks. Thus previous experiences will determine an individual's locus of control and feelings of competence towards achieving a task, as well as the locus of causality attributed to the success and failure of a task (Weiner, 1986).

Within the literature, (Donohoe, Topping, & Hannah, 2012; Hochanadel & Finamore, 2015) individuals with a fixed mindset are likely to prioritise performance over learning, often exhibiting a helpless response when faced with setbacks. Work is viewed as a way of validating their ability and failure represents the limits of their ability. However, individuals with a growth mindset are likely to embrace and seek challenges in learning. They will persevere when faced with challenges or adversity and hold higher levels of intrinsic motivation (Donohoe et al., 2012). Those with a growth mindset often display a mastery oriented response to learning and will attribute failure to lack of effort rather than a lack of ability.

Implicit theories of intelligence do not necessarily contradict other motivational theories (Maslow, 1943; Ryan & Deci, 2000). Rather, they contribute to the understanding of how motivation and resilience can be affected and increased in school. Crucially, unlike other intelligence theories, which are viewed as relatively stable, there is some evidence that core beliefs can be altered through supporting the internalisation of alternative schema. Therefore Dweck (2000) suggests the mindset an individual holds is not static and unchanged but rather can be influenced and moved. Perhaps applicable here is Cattell's (1971) crystallised and fluid intelligence; crystallised intelligence (for example, general knowledge or language) is regarded as malleable, whereas fluid intelligence (for example, problem solving) often stabilises in adolescence. In relation to this Furnham (2014) found that individuals held a

different mindset depending on the task and mindset was the strongest predictor of change-ability to multiple intelligences.

Another pertinent view point is Saarinen and Hämäläinen (2010) who propose systems intelligence. Here they take a gestalt stance that the whole is greater than the sum of its parts (Ehrenfels, 1890). Therefore, intelligence cannot be fully understood by compartmentalising into specific domains. This contradicts other intelligence theorists (Sternberg, 1977); rather, it focuses upon thinking, acting, and getting involved into dynamic processes with feedbacks within a complex system (Rauthmann, 2010, p. 29).

Although in its infancy within research, systems thinking is an interesting concept and can be applied to mindset. For instance, mindset may fluctuate from one activity to the next depending on both internal and external ecological systems which interplay or even the subject or activity assigned that day. This poses an important question; if it is true that an individual's mindset can fluctuate depending on ecological factors then how can schools' systems be supported to encourage a growth mindset view point? It is proposed that it may be necessary to move towards a social constructivist stance (Berger & Luckmann, 1991): for instance, what the belief held means for the individual and how the individual can be supported to make this belief more visible to them, whilst making positive learning strategies more real to them.

The role of teachers

It is posited that a teacher's own mindset belief and practice is vital to supporting students to consider their own mindsets and to develop thinking strategies to support their learning. Of note here is Hattie's (2012) visible learning. He conducted a meta-analysis and found that a variety of classroom level practices have a strong effect on student learning, for example, teacher–student relationships and type of feedback. Hattie argues that when teaching and learning are visible and metacognition is explicit there is a greater likelihood of students reaching a higher level of achievement. To support this teachers must see learning through the eyes of their students, supporting and scaffolding them to become their own teachers. It is proposed that teachers' beliefs have the greatest influence on student achievement and may be able to exert the most influence (Hattie, 2012). Therefore, differing mindsets, or assumptions, that teachers possess about themselves and their students play a significant role in determining their expectations, teaching practices, and how students perceive their own mindset.

Relating to ecological theory, the way in which an individual views their intelligence can influence and be influenced by several systems within the environment (Bronfenbrenner, 1979). Thus, an individual's ecological system will intertwine with another's ecological system. It can be argued that the interactions of the microsystem may have the most effect, that is, interactions between teacher and student (O'Kane, 2007). This is complex; not only does a teacher's perception of a student's ability reinforce the student's view of themselves, but also a teacher's own self-view impacts their own approach and confidence levels. Therefore, teacher beliefs and student beliefs are intertwined and must be considered when designing an intervention. This is also a vital consideration when seeking sustained change.

Although it is important to recognise the initial positive impact on student outcomes of directly teaching mindset (Blackwell et al., 2007), there is no evidence of a sustained change in core beliefs. Therefore, there is a need for an alternative approach to be considered. One

approach may be to support teachers to develop growth mindset practices in their teaching.

Thus, it is key to help teachers to gain knowledge and confidence towards implicit theories and provide opportunities to experience cognitive dissonance to support sustained change to their practice. Cognitive dissonance is when an individual is presented with a concept which is contrary to their core belief (Festinger, 1957): discomfort is often experienced when two contradictory beliefs are held. It is suggested that an individual will seek resolution when in dissonance which will result in an attitude change, either affirming their initial belief or shifting to a new belief. Previous research has found individuals can develop new cognitions which challenge and change deeper schema held by them (Martin, 2015). However, this cannot be sustained if the intervention is not embedded at a systemic level. Whilst there is no optimum intervention time frame indicated within research, it is clear that one-off individual programmes cannot effect long-term change. This led to the research adopting a longer training programme.

It is expected that, within a training programme, there will be opportunities to link participants' new and old knowledge, in particular through active learning and reflection. This will lead to sustained change to participant practice. It is theorised that this will ultimately influence how students perceive their own mindset and the thinking strategies they apply to learning, however, this study does not seek to directly measure students' mindsets.

Previous mindset interventions

Within the literature, the majority of studies investigate the direct impact of mindset interventions, that is, directly teaching about implicit theories on participants' pre- and post-mindset (Blackwell et al., 2007). Although there is substantial evidence that the intervention influences immediate positive change directly afterwards, there is no robust evidence for sustained change. The lack of long-term sustained evaluation within the literature is concerning.

Shumow and Schmidt (2013) conducted a study investigating the influence of two teachers' practices on their students' beliefs about intelligence. They found that the teaching practices employed, and student–teacher interactions, influenced mindset. They suggest that teachers play a critically important role in supporting classroom interventions. It was suggested that training programmes should seek to influence teachers' practices in order to maximise impact. Although a limitation to this study is the small sample size, it highlights the importance of supporting teacher knowledge and skills when implementing classroom interventions.

Bonne and Johnston (2016) recently conducted a study involving 91 students and a control group investigating the effect of small changes to teacher practice on students' beliefs about intelligence and academic achievement. Changes included focusing on making students' progress explicit and increasing students' self-efficacy. They found changes were effective in building students' views of intelligence and academic achievement within the intervention group when compared to the control group. This reinforces Hattie's (2012) research which emphasises the effect of practitioner practice and the use of feedback to students.

As with many theory-based constructs, bridging the gap between theoretical stances and changes to practice is complex and challenging. Implicit theories may provide an insight

into this as they provide a firm foundation for how mindset can be implemented, understood and impact at an operational level.

Aims of the current research

There is a growing body of research which implies that holding a growth mindset view of intelligence can support an individual's resilience, perseverance and motivation towards learning (Donohoe et al., 2012; Dweck, 2000; Hochanadel & Finamore, 2015). Despite this, there are several unanswered questions which need to be addressed, particularly in relation to the teacher's role in supporting change. In addition, there is a lack of diversity within the research field with the majority of research dominated by Dweck and colleagues. The current research attempts to address these areas by empowering teachers to explore growth mindset through evaluating a training programme within a cluster of schools (one high school and five primary schools) in a local authority in Scotland. To support the success of this research, theories of adult learning, including andragogy (Kolb, 1984), and organisational change, including implementation science (Nilsen, 2015), were drawn from when designing the content and activities employed in the training programme. This research aims to evaluate the impact of training on teachers' mindset, their subsequent practice and sustained change (Dweck, 2000).

Methodology

Taking a pragmatic epistemological stance, a mixed methods design was used gathering both qualitative and quantitative data (Dewey, 1925; Feilzer, 2010).

Participants

Within local authority A, a cluster of schools consisting of one high school and five primary schools had identified an interest in growth mindset. When selecting participants it was deemed appropriate to run a pilot training programme within a school cluster. Prior to selecting participants an input on growth mindset was delivered at a school cluster meeting to senior management. This enabled the senior management of each link school to decide whether they would like to participate in the offered training. A purposive sampling method was adopted to ensure all schools expressing an interest in growth mindset would have access to the training programme.

A pilot training programme was then developed for interested participants. There were two phases; firstly an information session for all interested staff members (37 participants), then five further sessions for a subset (17 participants) of the first group identified as mindset champions. A lower number of participants (eight) attended the final session. In accordance with implementation science (Nilsen, 2015), identified mindset champions had differing roles within their establishments.

Materials

Quantitative measures

Pre- and post-measures were used to indicate the confidence rating of participants and their personal learning aims for the sessions. Participants' mindsets were measured using Dweck's

(2000) Theories of Intelligence Scale Self-form for Adults, which has been found, using Cronbach's alpha, to be reliable at 0.78 and has a test–retest reliability of 0.77 (Blackwell et al., 2007).

Qualitative measures

Three blessings. Participants were asked to complete a brief daily “mindset incidence” booklet detailing three incidents of mindset within the classroom (Friedrickson, 2003). Drawing from positive psychology focusing on three positive thoughts each day can broaden an individual's behavioural repertoire, supporting their skills and resources (Friedrickson, 2003). By focusing on three “blessings” an individual accumulates personal resources which begin an upward positive feedback loop. It is suggested by the researcher that when individuals are asked to identify mindsets within the classroom this will activate their ability to implement change.

Structured debrief. An evaluation of the training was gathered through a semi-structured debriefing in session five. This method was chosen as it creates a reflective and flexible method of information gathering. Based upon Gibbs (1988) cycle of structured debriefing there are several stages undertaken throughout this process:

- (1) Description of events
- (2) Evaluation of feelings
- (3) Evaluation of event
- (4) Analysis of what happened
- (5) Analysis of next steps
- (6) Personal next steps

Steps one and two were discussed verbally during the evaluation. The remaining steps were captured through four questions and discussion: What were the two most useful things about this training? What were the two least useful aspects of this training? What was the most significant thing learnt? How will I use this in future?

The cyclical nature of the reflection tool provides an opportunity for participants to identify key learning experiences from training, analyse these experiences, draw general conclusions from the collection of experiences discussed and identify steps when moving this process forward (Meyers, 2014).

Follow up. Participants were asked to complete a follow-up questionnaire adapted from the needs analysis questionnaire after three months. In addition, participants were asked to complete a follow up of Dweck's (2000) Theories of Intelligence Scale Self-form for Adults pre- and post-measure to investigate whether change was sustained.

Procedure

The intervention consisted of six training sessions. In line with andragogy (Kolb, 1984), several methods were drawn from in order to engage and empower participants. In addition, participants were supported to participate in independent and practice problem solving by incorporating a Problem Based Learning (PBL) framework within the training sessions (Hannah, Ingram, Kerr, & Kelly, 2015).

Results

Data analysis

Due to the small sample size (17 participants) the normality of the sample was checked prior to undertaking a parametric or non-parametric test. Normality was held for Dweck's (2000) Theories of Intelligence Scale Self-form for Adults. Therefore a paired *t*-test was employed for pre- and post-measure. For the post-evaluation follow-up measurement a repeated measures analysis of variance (ANOVA) was employed. A pairwise comparison was then conducted. Normality was not upheld for the confidence ratings measure; therefore a Wilcoxon Signed Rank test was employed.

A thematic analysis was used to identify key themes within the data collected from the structured debrief. To guide data analysis Braun and Clarke's (2006) thematic framework was employed.

Due to the directive nature of the three "blessings" employed, descriptive excerpts from one randomly selected mindset incidence booklet were analysed. This was to provide evidence of the types of incidences recorded. The results illustrate reflections from a primary school teacher.

Quantitative measures

Pre and post

A paired sample *t*-test was conducted to evaluate changes to participants' perception of their mindset using Dweck's (2000) Theories of Intelligence Self-form for Adults. There was a statistically significant increase in mindset scores from Time 1 [mean (*M*) = 4.63, standard deviation (*SD*) = 2.22] to Time 2 (*M* = 8.5, *SD* = 1.15), $t(15) = -6.2, p < .0001, d = 3.2$ (two-tailed). The mean increase in mindset score was 3.88 with a 95% confidence interval ranging from 2.54 to 5.21. The effect size for this analysis ($d = .85$) was found to exceed Cohen's (1988) convention for a large effect ($d = .80$).

Pre, post and follow up

A one-way repeated measures ANOVA was conducted to evaluate changes to participants' perceptions of their mindset using Dweck's (2000) self-form for adults at Time 1 (prior to the training), Time 2 (immediately post-training) and Time 3 (three month follow up). There was a significant effect for time, Wilks' lambda = 0.27, $F(2, 6) = 8.125, p < 0.02$, multivariate partial eta squared = 0.73.

A pairwise comparison illustrated in Table 1 was then conducted to provide further information on the significant differences between times.

Table 1. Pairwise comparison of mindset between time points.

Time 1	Time 2	Mean difference	Standard error	<i>P</i> -Value
Pre-intervention	Post-intervention	-.56	.14	.01*
	Follow up	-.79	.25	.05*
Post-intervention	Pre-intervention	-.56	.14	.01*
	Follow up	-.23	.25	1.0
Follow up	Pre-intervention	.79	.25	.05*
	Post-intervention	.23	.25	1.0

*Indicates statistical significance.

Confidence ratings

Using a Wilcoxon Signed Rank Test there was a statistically significant increase in confidence towards: the concept of mindset following the intervention $z = -3.34, p < 0.001$, with an adequate effect size ($r = 0.59$); recognising participants’ own mindset following the training $z = -3.53, p < 0.001$, with an adequate effect size ($r = 0.62$); recognising mindsets of class students following the training $z = -3.36, p < 0.001$, with an adequate effect size ($r = 0.59$); and towards applying growth mindset strategies with students following the training $z = -3.48, p < 0.001$, with an adequate effect size ($r = 0.62$).

Qualitative measures

Three “blessings” diary examples

Growth mindset. Asked the class the meaning of a word they were not sure. Every time they attempted a definition, saying “not yet” or “not quite”. It was amazing how many volunteered to answer and kept on trying. Almost everyone in the class had a go.

Fixed mindset. A boy was worried about getting something wrong and did not want to attempt work. Had to convince him that mistakes are good; he has a very fixed mindset and low self-esteem.

Structured debrief

When asked to identify two most useful aspects of training four key themes were identified: awareness of own practice, change in practice, knowledge base, resources and professional dialogue. These are illustrated in Figure 1.

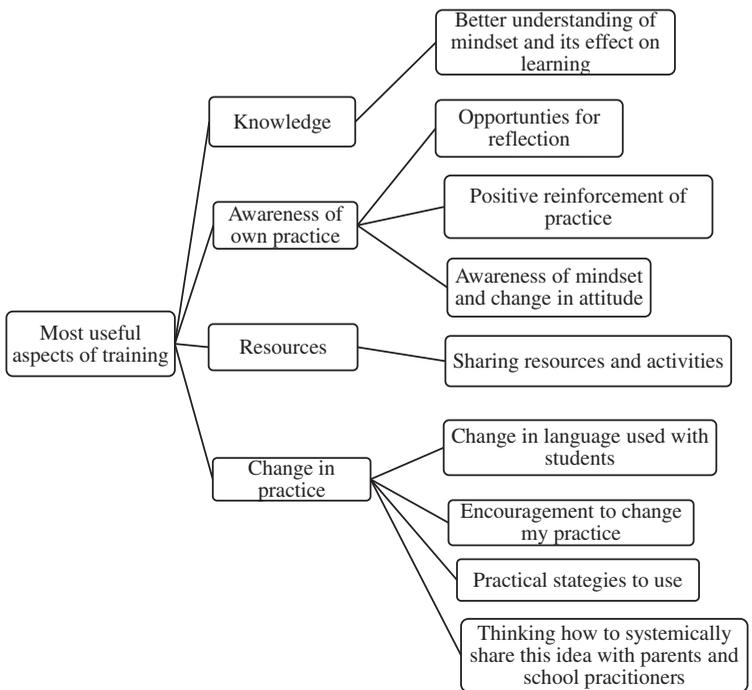


Figure 1. Identified themes of the most useful aspects of training.

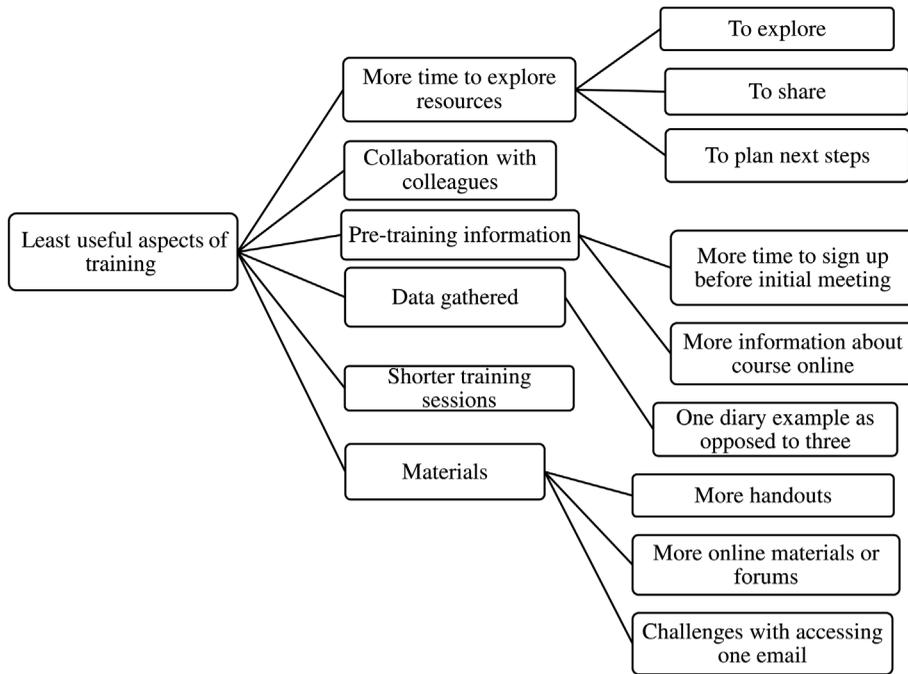


Figure 2. Identified themes of the least useful aspects of training.

When asked to identify two least useful aspects of training, six key themes were identified: length of training, time, collaboration with other colleagues, pre-training information, materials and data gathered. These are illustrated in Figure 2.

When asked to identify the most significant learning objective, four key themes were identified: impact of practitioner (participant), change, impact on students and impact on school. These are illustrated in Figure 3.

When asked to identify how implicit theories will be used in future, five key themes were identified: mindset champions, whole school approach, whole cluster approach, parents and through practice. These are illustrated in Figure 4.

Follow up (three months post-training)

When asked to indicate how useful the training had been in contributing to participants practice, the mean usefulness was 9.25 out of 10 ($SD = 0.89$). When asked to indicate what changes participants had noticed as a result of the training programme, four key themes emerged: change in language, practitioner (participant) change, embedding in practice and impact. All participants indicated that they felt very confident or fairly confident about wider sharing the concept of growth mindset.

Discussion

This research aims to evaluate the impact of training on teacher mindset beliefs, subsequent practice changes and whether these were sustained (Dweck, 2000). In alignment with a pragmatic stance, a mixed method research design was employed. Statistical analyses and

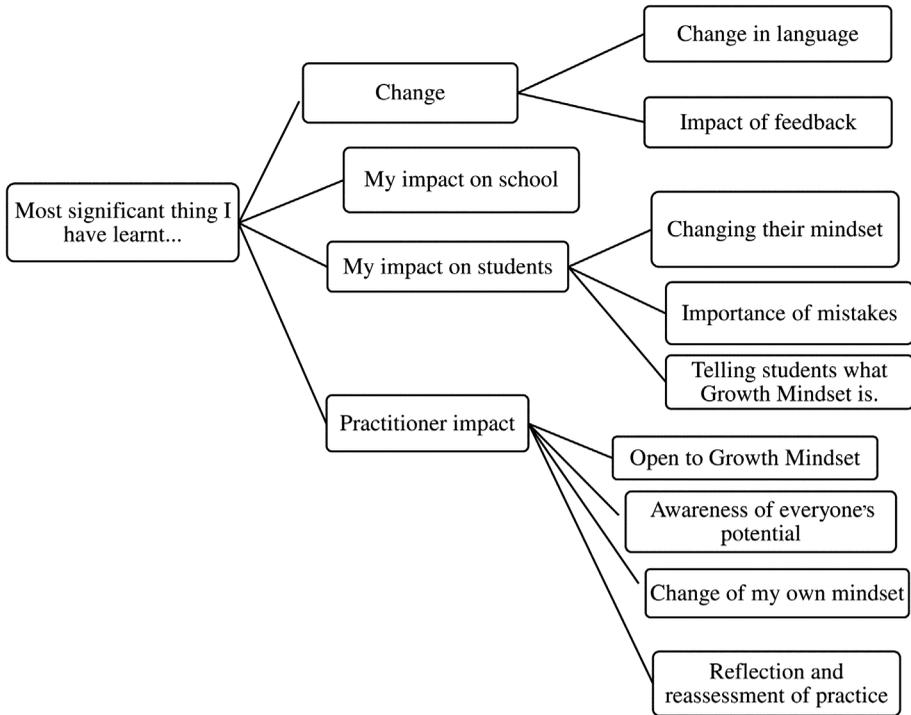


Figure 3. Identified themes of the most significant learning objectives.

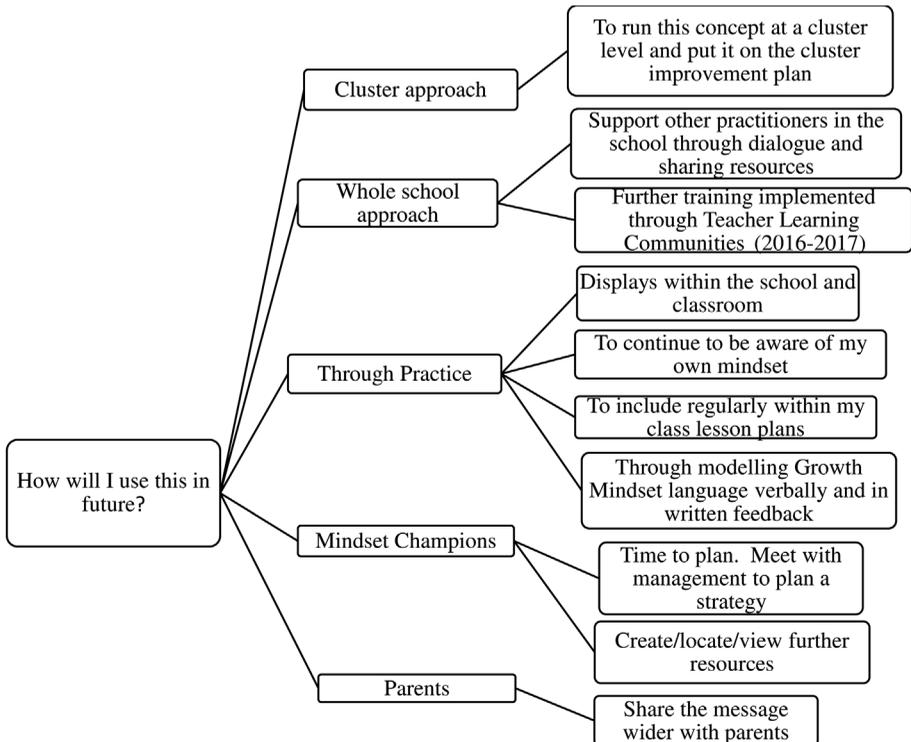


Figure 4. Identified themes of future uses of implicit theories.

thematic analysis were also implemented. Through this process several key findings and themes emerged which will now be discussed.

Mindset questionnaire

The findings of the immediate mindset questionnaire indicate a significant shift towards growth mindset between pre- and post-training. This aligns with previous research involving students which has found immediate shift in mindset after direct training (Blackwell et al., 2007). The researcher posits that when the concept of mindset is at the forefront of a participant's thinking and they have not been presented with any contradictory evidence in practice it is likely they will align with the concept presented (Martin, 2015). It is expected, as participants begin to embed mindset independently within their practice, that the strength of change may fluctuate, for example, it may be reinforced or weakened depending on encountering differing situations in practice.

Crucially, unlike previous interventions (Donohoe et al., 2012), three months following the training, a significant shift towards growth mindset was observed for all participants. The researcher proposes that the short-term sustained change may be due to several variables aligning with implementation science (Nilsen, 2015). Firstly, sustained change may be due to programme design, that is, by creating a bespoke training package which is needs led. Secondly, there is some evidence that longer programmes allow opportunities to challenge underpinning core beliefs through participants experiencing cognitive dissonance by creating a space to create new connections between existing knowledge and new knowledge (Festinger, 1957).

This leads to the assimilation of new knowledge or a shift in the core beliefs of participants. This may be a reason why one-off training sessions do not impact sustained practice change. Thirdly, by encouraging participants to identify three incidences of mindset a day ("blessings") it is argued that participants accumulated personal resources which began an upward positive feedback loop (Friedrickson, 2003). When opposed by a contradicting view point it is proposed that participants had several resources to draw from to counter and discard this stance.

In addition, results indicated a significant shift between pre-questionnaire data and post-data and pre-data and follow-up data. However, no significant difference was observed between post-data and follow-up data. This suggests a participant's mindset did not continue on an upward trend and rather stabilised after the training. The researcher would suggest this indicates a participant's view of intelligence can be significantly influenced through training. Furthermore, when core beliefs are challenged and a participant begins to internalise the new concept, it may remain relatively stable after three months.

Confidence ratings

Participants indicated that the training significantly increased their confidence about the concept of mindset, recognising their own mindset, recognising the mindset of others and applying mindset principles. This suggests that participants have an increased self-efficacy, locus of control and the ability to implement change (Devos, Vanderheyden, & Van Den Broeck, 2000). As previously mentioned, this may be due to having a widened behavioural repertoire towards implementing change and access to practical strategies to apply in

relation to mindset (Friedrickson, 2003). Therefore, it can be argued that the training programme increased participants' capability to change and implement mindset.

Three "blessings"

Although no evaluative evidence was collected of the effect of the mindset training on students, the diary case study provides a useful insight into the impact of mindset on the practice of participants taking part in the training programme. It must be cautioned that this information provides a snap-shot of change for a primary school teacher and should be interpreted accordingly. For this individual, over the course of the five weeks, they identified more incidences of growth mindset than fixed mindset; examples identified included reflections on self, students and colleagues. This suggests that all identified incidences were from the individual's immediate environment falling within the microsystem (Bronfenbrenner, 1979).

Crucially, within the diary both growth mindset and fixed mindset examples indicated the individual's cognitive dissonance (Festinger, 1957) and evidenced critical reflection towards mindset. For instance, the individual reflected on a teaching approach, wondering whether the approach adopted was the most effective or the best stance to take and what they might do differently next time. In particular, there was an increased confidence and change to practice when tackling tasks which they may have previously avoided, such as planning a language lesson. This provides concrete evidence for the internalised conflict this participant feels between the approach they would usually have adopted and their new knowledge around intelligence. There was also some clear change in practice indicated; for instance, when giving written feedback changing from "well done" to "great effort". This suggests that some aspects of change were implemented without the need for a high level of time and resource input (Devos et al., 2000).

However, the evidence suggests there will still be incidents when a participant may not have the capacity to apply growth mindset to a situation. This individual indicated having a fixed mindset towards attending a course, stating it would have no applicability to their practice. However, upon reflection they decided they should have perhaps held a different mindset. Again, this reinforces the researcher's stance that mindset is not a fixed construct but rather it fluctuates depending upon the situation. This presents a clear change in the participant's initial belief of a situation when presented with contradictory information and a change to future approaches. It was wondered whether writing the information in a diary helped to organise participants' thoughts about growth mindset and reflect on applying it in the classroom.

Structured debrief

Most useful aspects of training

When asked to evaluate the most useful aspects of training two of the themes identified were awareness of own practice and knowledge base. Awareness of participants' own practice is vital when introducing a new concept as it supports the reflection and connecting of previous knowledge and practice to new knowledge and practice (Kolb, 1984). This suggests training provides an opportunity to reflect and change participants' practice.

Other themes identified were **access to resources, professional dialogue and change in practice**. This suggests that as training progressed participants began opting and integrating the new concept into practice, for example, through the use of language and practical strategies (Nilsen, 2015). By employing a PBL framework it is suggested that participants were encouraged to test out, deepen and practically apply new skills from the training (Hannah et al., 2015). They were also encouraged to engage in professional dialogue and joint problem solving, particularly in relation to whether this new concept sat uncomfortably with their core beliefs (Kolb, 1984). This was helpful as participants were able to discuss real life challenges that arose within the problem scenario and apply theoretical discussion into practice. This is unlike the use of PBL within an education system. The practical application of mindset strategies appears evident in the examples given in the three blessings diary entries: for instance, applying growth mindset feedback within the classroom or through written feedback.

Least useful aspects of training

When asked to identify least useful aspects of training two of the themes identified were **length of training programme and time**. According to implementation science there is a **need for training to be practical and relevant to practice** (Nilsen, 2015); however, a key consideration is the **commitment of participants to the training**. Although literature indicates one-off training events do not elicit systemic change, **there is no guidance for the optimum length of programme to effect change**. Devos et al. (2000) indicate time and resources influence an individual's ability to effect change. Therefore, it must be considered whether this training could maintain high impact whilst reducing the time required to undertake it. Another theme identified was collaboration with other colleagues. Although the activities chosen involved a high level of professional dialogue, greater prompting of colleagues to mix would have helped to scaffold across school discussions. Other themes identified were pre-training information, materials and data gathered. These related to practical aspects of running the course, such as information about the training and electronic resources.

Most significant learning objective

When asked to identify the most significant learning objective three key areas emerged which all centred on impact: **impact on practitioner (participant), impact on students and impact on school**. An outcome of the training programme was the **impact on participants through providing encouragement to reflect and assess their own mindset**. This reinforces the shift seen between pre- and post-measures and follow-up measures of the mindset questionnaire.

Participants **indicated that they have the resources and skills to share this concept within the wider school community**. It is suggested that participants maintained ownership of mindset therefore were intrinsically motivated to sustain practice and support organisational change (Devos et al., 2000). Finally, impact on students was indicated. **Although anecdotal evidence, some participants indicated changes to student behaviour; for instance, using growth mindset language helped them to persevere.**

Another theme identified was change in feedback and language used within the school environment. This aligns with key messages of mindset, for example, shifting from output praise to process praise (Dweck, 2000). It is important to acknowledge that the type of feedback and language used within the classroom impacts a student's mindset. It is also

possible to implement visible strategies which will support their learning (Hattie, 2012). This was supported by the three blessings case study which indicated that the use of language is crucial in enabling students to experience success. This indicated there was a clear practice change of participants.

Future use

When asked to identify how implicit theories will be used in future five key themes were identified: mindset champions, whole school approach, whole cluster approach, through practice and parents. This reinforces the need for the approach to be driven across several ecological systems (Bronfenbrenner, 1979) and from a “top-down” and “bottom up” approach (Herold, Fedor, Caldwell, & Liu, 2008). It was indicated that support to staff and training were important to disseminate the concept more widely and to support consistent approaches (Nielsen, 2015). To do this participants indicated that they would plan Teacher Learning Communities to support and deliver training to staff. In addition, the school clusters leadership have subsequently named mindset as a topic in the cluster improvement plan. This ensures there is a commitment to continue to explore and embed growth mindset across the cluster. The importance of sharing the concept with parents was also indicated. This suggests the training programme has led to a commitment from the school cluster to continue to explore and evaluate growth mindset in their schools.

Follow-up evaluation

When asked to complete a follow-up evaluation three months later participants indicated that training still impacted their practice. This suggests that the training was applicable to their practice (Beavers, 2011). All participants indicated that they felt “fairly” confident or “very” confident when sharing mindset with the wider school community. It is speculated that, as participants continue to experience success, their confidence towards mindset will continue to grow and develop through consolidated and reinforced knowledge (Kolb, 1984). Participants also indicated there was a sustained change to their practice within their schools after three months. This can perhaps be attributed to the design of the training programme and aligns with data gathered from the mindset questionnaires. In addition, it suggests that participants were motivated to continue new practices.

Limitations

The aim of this research was to evaluate the impact of training on teachers’ mindset beliefs, their subsequent practice and whether change was sustained (Dweck, 2000). The findings of this research should be considered within the limitations of the design and methodology. Firstly, the small sample size (17 participants) should be highlighted, in particular the reduction of participants (to eight) in the follow-up session. Nevertheless, the outcome of this research should provide a rationale to consider further study, for instance, investigating the breadth and depth of systemic change. Secondly, it could be argued that change may have been compounded because of participants’ self-selection to take part in the programme. The researcher argues this is not the case, due to the increased and sustained impact of training; although it should be considered that participants may have exhibited a higher

level of intrinsic motivation to learning and embedding the concept (Devos et al., 2000). In addition, as no control group was utilised, internal validity should be questioned.

Thirdly, although a strength of this research is the collaboration across the high school and primary schools, future research should perhaps consider the complexity of the high school as an organisation and whether more intensive support may be required to support systemic change. Finally, this research sought to measure the impact of training on teachers' mindset. Future research should perhaps consider how best to measure the immediate and sustained impact of teacher training on students.

Implications for future educational psychology practice

As outlined by the Scottish Executive in the Currie Report (2002), training is a core function of an educational psychologist (EP). This research adopted a robust rationale drawing from several underpinning theories, thereby **creating a framework to deliver a training programme.** Future research should consider this framework.

Within this function a key role is supporting readiness for change and allowing ownership of implementation to remain with the school. **The role for the Educational Psychology Service in this circumstance was to carry out the research but furthermore to provide support and training for the participants to develop a plan for next steps. For future training it is vital that participants feel they are ready and capable of change, as without this drive the likelihood of successful implementation is reduced.**

Another core function role outlined by the Currie Report (2002) is **consultation.** At this stage role negotiation and clarity of actions is vital. A key role for EPs may be to **support through consultation a school's readiness to change.**

Finally, another key function for EPs is contributing to research, therefore supporting changes to future educational psychology practice. Although there is a growing body of research investigating and evaluating growth mindset, it is still a relatively new concept. In addition, research almost exclusively investigates supporting classes to develop a growth mindset. Therefore, there is a need to contribute further to research looking at the effect of mindset for individuals with additional barriers of learning to overcome. With a high number of schools nationally and internationally becoming interested in adopting this approach there is an ever-present need to have a clear rationale and knowledge of the impact that it may have; arguably an EP is in a distinctive position to gather this information.

Conclusion

With a growing number of schools using growth mindset approaches, this research provides an insight into effecting change through systemic working across a cluster of schools within a Scottish local authority. It contributes a distinctive view to implicit theory research by investigating the impact of a training programme on practitioners and their practice. In addition, it provides evidence of the impact of a training programme on a participant's mindset and sustained practice change after three months. This suggests that an individual's mindset is malleable and can shift. Although limitations must be considered, this research provides a promising platform for future educational psychology research and practice.

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