Research for Teachers

Promoting students' persistence in meeting challenges

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Helping students to achieve their potential and motivating them to work hard to do so is an aim of central importance for most of us.

The study summarised in this TLA research summary focuses on student motivation and achievement and explores how they relate to beliefs that students hold about themselves and about the nature of ability. The book, summarised in *Self-theories: Their role in motivation, personality and development* (Dweck 2000), aimed to explore why some young people exceed expectations and others fail to fulfil their potential.

Carol Dweck has spent over thirty years researching how learners responded to experiences of difficulty and challenge. She and her colleagues consistently found that, when pupils met difficulties and setbacks in their work, some responded by tackling the challenges with determination, whilst others quickly gave up. The two groups of students showed strikingly different ways of talking to themselves during a challenge. They also held different beliefs about the nature of ability or intelligence and the value of effort.

Dweck's experiments explored:

- the relationship between learners' beliefs about the nature of intelligence and their behaviour on challenging tasks
- whether learners' beliefs about the nature of ability could be changed and the effect of changing such beliefs on their persistence in the face of difficulties
- whether experiences of success increased learners' desire for challenge and extended their ability to cope with setbacks
- the possible roots of vulnerability in young children
- the effects of different types of praise and criticism
- the social effects of a belief in fixed traits.

Her work prompts and guides reflection on the value of practices such as offering praise for ability and

achievement, or labelling students as having a particular level of ability. The findings also lend support to the use of teaching and learning initiatives that develop learners' skills in their conscious use of problem-solving strategies, promote a shared understanding of quality during formative assessment and develop resilient attitudes amongst learners.

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Overview

Why is the issue important?

Helping students to achieve their potential and motivating them to work hard to do so is a central aim of teaching.

What did the research show?

Students who had a fixed view of their intelligence showed self-defeating behaviours in the face of a learning challenge. They believed that intelligence was innate and that it determined their performance on a task to a greater extent than effort or persistence. Such students quickly lost confidence when they experienced obstacles, gave up and blamed themselves when they performed badly (regardless of any previous successes), avoided challenges and reduced their level of effort.

More resilient students had a 'growth mindset'. They believed that ability on a task could be improved through effort and trying new approaches. They saw encountering difficulties as a natural part of the process of learning and persevered.

It was possible to change students' self-theory of intelligence and doing so made a big difference to their achievement.

How was this achieved?

Older students with fixed mindsets ascribed their mistakes to an innate lack of ability. When this belief was directly challenged, they became more persistent. Young children exposed to praise that focused on ability, or to general criticism when they did something wrong, associated success with being 'good' and making mistakes with being 'bad'. This led them to judge themselves according to how they performed on tasks. The best kind of feedback was task focused, not personal, and praised effort, strategies and outcomes. Teachers also supported students' persistence by equipping them with problem-solving strategies that were specific to the particular challenge they faced and by explicitly teaching students a) about the need to expend time and effort when learning a skill and b) that initial failure is a healthy sign that a challenge is worth pursuing.

How was the research designed to be trustworthy?

A wide variety of empirical experiments were conducted over 30 years involving a large number of pupils and students of all ages. The experiments were repeated many times with groups from different geographical areas, socio-economic backgrounds and with different age groups. All the experiments were designed to leave the subjects with a positive sense that they had learned or achieved something. Questionnaires were used to measure students' confidence, goal choices and implicit theories of intelligence and personality.

What are the implications?

The study showed the importance of:

- helping students develop an incremental view of learning which makes them more inclined to engage with challenge and take risks that enable them to grow
- finding ways of praising students without unintentionally labelling them as 'intelligent', for example, by discussing the process of how they created something or reached an answer
- helping vulnerable students see that the need for effort does not indicate a lack of ability
- encouraging students to remember and use strategies to help them tackle challenges
- formative assessment that equips students with tools to improve the quality of their work.

What do the case studies illustrate?

The case studies show:

- ways in which students managed or were affected by frustration
- the positive effects of rewarding participation and effort in a 'no blame' context
- how a primary school teacher found the feedback she gave the girls and boys in her class tended to reinforce gender stereotypes and what she did about this
- ways very young pupils were supported to tackle challenging problems in the context of outdoor education
- the impact on pupils of different types of praise.

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Study

How did students respond to difficulty and failure?

Dweck and her colleague Carol Diener investigated how pupils, initially 5th and 6th grade pupils (equivalent to UK Years 6 and 7) thought and responded when they met with failure on a task. They gave the pupils a series of conceptual problems to solve. The first eight of these were designed to be within the pupils' capabilities and the next four problems were intended to be too hard for the pupils to solve. When faced with this challenge, pupils usually showed one of two different responses:

- a helpless response in which students doubted themselves, questioned their ability, lost heart and gave up trying when they met obstacles
- a more resilient, mastery-orientated response in which they remained optimistic that they would eventually succeed and kept trying to solve the problems.

The proportions of vulnerable and resilient pupils was about the same. Readers might like to read a case study in which English Key Stage 3 students showed either frustrated or persistent responses in response to a physical challenge.

The researchers replicated these findings in later, similar experiments with many other students of different ages and backgrounds. They found that the decision to give up or to persevere did not depend on the learner's actual level of skill. Many accomplished students gave up easily and questioned or condemned their intelligence when they failed. Many less skilled students tackled difficulties with relish and persistence.

The main difference between the two groups seemed to lie in the meaning that learners ascribed to their experiences of difficulty or failure. The mastery-orientated pupils focused on the problems to be tackled, not on the possibility of failure or reasons for it. These pupils did not believe that experiencing difficulty on a task showed anything negative about them. They valued effort, sought challenge and enjoyed the process of learning. The pupils who showed a helpless response seemed to perceive the process of struggling with a task as an indication that they lacked something within them. They saw failure on a task as a personal indictment and found this painful, so they tried to avoid challenges as much as possible.

How did different types of self-talk help and hinder students as they faced a challenge?

Students involved in the experiments were asked to state what they were thinking during the process. Those who were vulnerable to failure differed from the more resilient students in how they talked to and/or about

themselves whilst facing difficulties. The vulnerable students denigrated themselves and their ability and showed a self-defeating pattern of talk, whilst the resilient students remained much more positive.

Vulnerable pupils

When faced with challenging work, students who were vulnerable to failure often blamed their intelligence for their failures. They said things like:

- 'I guess I'm not very smart.'
- 'I never did have a good memory.'
- 'I'm no good at things like this.'

Many pupils made wild guesses in response to the questions. Some pupils tried to distract attention from their failure by chatting about accomplishments elsewhere and many pupils claimed to be bored. Many pupils became despondent, lost confidence and predicted that they would fail on a similar future tasks. Their subsequent success rate dropped.

Resilient pupils

When resilient students were faced with challenging work, their self-talk was much more self-motivating, positive and helpful. They said things like:

- 'I should slow down and try to figure this out.'
- 'The harder it gets, the harder I need to try."
- 'I've almost got it now.'
- 'Mistakes are our friends.'

These pupils also remembered and used strategies to help them overcome the problems. They:

- 'focused on the problems to be tackled
- 'reminded themselves of what they had learned so far
- 'began to tell themselves how they could improve.

The resilient pupils' ability to use strategies that directly addressed the problems supported both their confidence and their progress. Two thirds of them made an optimistic prediction of their eventual success and several seemed to relish the challenge. Readers interested in the use of explicit strategies to improve learning may be interested in two case studies listed under Further Reading.

How did students' beliefs about intelligence predict their learning choices?

Several studies asked students taking part to complete questionnaires on their beliefs about intelligence. Some students had what Dweck called a 'fixed mindset'. They believed that they were born with a fixed amount of intelligence. Other students believed that intelligence could be cultivated and increased by education and by practising skills. Dweck called this belief a 'growth mindset'. Students' beliefs about intelligence influenced the type of schoolwork they preferred.

Students with a fixed mindset, agreed with statements like:

- The main thing I want from my schoolwork is to show how good I am at it.
- I mostly like schoolwork that I can do perfectly without any mistakes.
- Sometimes I would rather do well in a class than learn a lot.

Students with a growth mindset, agreed with statements like:

- I like schoolwork that I'll learn from, even if I make a lot of mistakes.
- I like schoolwork best when it makes me think hard.

- It's more important to me to learn new things in my classes than to get the best grades.

Learners with a fixed mindset seemed to prefer to look good, rather than to learn. Some were so concerned to avoid failure or looking stupid, that they avoided even a small degree of challenge.

Students tested in grade 8 (UK Year 9) to see whether they held fixed or growth mindsets were then asked to choose between tasks that would allow them to demonstrate what they could do or that offered them an opportunity to learn. The tasks carried varying risks of failure. They were labelled: 'easy enough so you won't make mistakes'; 'like something you're good at, but hard enough to show you're smart'; and 'hard, new and different: you might get confused and make mistakes, but you might learn something useful'. The study found that, of the students who believed that intelligence was fixed:

- 50 per cent chose the easiest option - to make no mistakes
- 30 per cent chose the option which allowed them to show they were good at something, and
- only 20 per cent chose the 'hard, new and different' option.

In contrast, of the students who thought that intelligence could grow:

- 60 per cent chose the most demanding option (hard, new and different)
- most of the rest chose the task which was 'hard enough to show you're smart'.

This study also revealed that girls were especially likely to choose the easiest option on this task. The research was repeated, with similar results, with younger pupils (aged 10 to 12). Readers may wish to refer to a case study on formative assessment in the 'Learning to learn' RoM, which discovered that pupils' attitudes to learning or performance goals changed as they moved through their schooling.

How did students' theories of intelligence affect their views on success and effort?

Students who held fixed or growth mindsets felt successful at different times and in different ways. The former felt most successful when they outshone other pupils, even when they were not learning much. The latter felt successful when they were learning, even if others outperformed them. The two groups also differed in their attitude to effort.

Students who believed in fixed intelligence wanted to do well, but also thought that the cleverest people did not have to work hard. They disliked having to work hard because it made them feel that they were not very clever. Moreover, they believed that, if they were not clever, hard work was not going to help them much. These students were therefore not inclined to work hard when they encountered difficulties. Instead, when students who believed in fixed intelligence faced a task they feared they could not achieve, they sometimes chose to put in little or no effort. This gave them a ready-made excuse for failure: 'I didn't do it because I couldn't be bothered to try, not because I was incapable.' Students who used this tactic handicapped their own progress.

In contrast, students who believed that current effort would increase their future ability felt successful during the process of learning and did not worry about comparisons with others. They worked hard to make progress. In one experiment, students who were motivated by learning goals and held a growth mindset produced 50% more written work in their attempts to find a solution to challenging, novel problems. Readers may like to read a case study in which a science teacher rewarded participation and effort and this led to improvement in the students' attainment.

Dweck concluded that learners' motivation to struggle on a task so as to master it or improve performance depended on their ability to separate performance on a task from self-worth. She found that attitudes that helped learning included student beliefs that:

- effort expended was unrelated to ability
- it was possible to learn from struggle

- it was possible to improve performance or 'achievement' over time
- effort and persistence were valuable strategies in the process of mastering a task
- success or failure on a task was not related to one's worth as a person.

Student beliefs that did not help learning included beliefs that:

- having to put in an effort indicated a lack of ability
- performance on a task was a measure of a more global capacity or ability
- intelligence or ability in a particular area were traits that could not be changed much
- it was more important to appear able or intelligent to others whose opinions you cared about than to learn something new at the risk of looking a fool.

How did challenging students' beliefs about their ability change their behaviour?

Studies found that, even though they may have experienced extended periods of success, learners who believed that tests could expose how clever (or not) they were, and who then struggled on a test, became discouraged by failure. They lost faith in their ability and showed a helpless response that affected their subsequent performance. They made low predictions of their future success and their actual subsequent performance also deteriorated. For example, vulnerable pupils' performance on a comprehension test dropped from 70% correct to 35% correct when two passages of simple text were interrupted by a deliberately confusing section of near-nonsense.

In another study, pupils who showed a vulnerable response on a maths test were asked to recall the items on which they had struggled. They underestimated how many problems they had solved correctly and overestimated the number on which they had failed. One third of these pupils predicted they would do badly on problems identical to those they had already successfully solved. When they were actually given problems almost identical to ones they had solved before, vulnerable pupils did worse than before.

Researchers saw that an experience of failure that also led students to doubt their ability had a strong negative effect on their subsequent attitudes and performance. They wanted to see if it was possible to change students' beliefs in a positive way. They gave college students in Hong Kong a comprehension test on one of two psychology articles that had been specially written for the experiment, but which looked genuine. Each article made a compelling case for either the theory that intelligence was fixed, or the theory that intelligence could grow. Half the students read each article. The students answered some comprehension questions and then took a test of non-verbal ability. The researchers told the students that they had either done relatively well or relatively poorly and asked them whether they would like to take a tutorial 'that was found to be effective in improving performance on the test for most people'.

The majority of students who had done well agreed to take the tutorial, regardless of the theory that they had read. Of those who had done poorly, only 13% of the students exposed to the article which promoted the theory of fixed intelligence chose to take the tutorial. They sacrificed a learning opportunity when they felt threatened that their inability would be exposed. However, 73% of the students who had done poorly, but had read the article which supported the theory that intelligence could grow, chose to take the tutorial. They had been led to believe that intelligence was not fixed and that ability could be improved, so they undertook a challenging learning task that offered them new opportunities to improve their skills.

Readers may wish to read a case study in the 'Learning to learn' RoM in which self- and peer-assessment successfully promoted students' beliefs that it was possible for learners of all levels of attainment to improve.

Which pupils were especially vulnerable when they moved on to secondary school?

Dweck's theory predicted that differences in performance between students holding a fixed or growth mindset would show up most clearly when they were exposed to obstacles and the possibility of failure. During the transition from grade school (primary school) to junior high school (secondary school), students were likely to encounter many new challenges. So Dweck and her colleagues explored student progress as they made the

transition from 6th to 7th grade and beyond. They compared students' achievement grades at the end of the first year of secondary school with their grades on leaving primary school. In line with their predictions, the researchers found that:

- students who entered junior high school with the belief that intelligence was fixed showed a helpless response in their new environment, tended to doubt their intellectual ability in the face of failure and their achievement relative to their peers declined, and
- students who entered junior high school with the belief that ability could grow were less anxious, focused on strategy and effort in the face of difficulties and maintained or improved their academic achievement relative to their peers.

Many children with a fixed mindset who were high achievers in 6th grade did badly at 7th grade and became anxious and apprehensive about school.

Confidence in ability

The students' mindset affected their progress more than their initial level of confidence in their ability. Students who had low confidence in their intelligence, but who had a growth mindset, showed the most impressive gains in achievement. They did not think they were clever, but they believed that their performance could be improved, so they worked at doing so, with considerable success. In contrast, students who had the highest confidence in their ability before entering high school, but who also held a fixed view of intelligence lost this self-confidence when they met difficulties. Their faith in themselves and their level of achievement both spiralled downwards and these students had still not recovered their confidence or previous level of achievement after an additional year. Further research replicated these results in different contexts.

Gender differences

A track record of previous success did not increase pupils' desire for challenge or help them to cope with setbacks. One group of students with the most striking history of success in primary school proved to be the most vulnerable after transition to secondary school. These were the bright girls. They readily mastered the work at primary school, but disliked making mistakes. When presented with challenge, they fell into a helpless pattern of behaviour and blamed their ability. A study described earlier found that almost all the girls with a fixed mindset chose a task labelled 'easy enough so I don't make mistakes', but that almost none of the boys did. The boys preferred a task labelled 'like something you're good at, but hard enough to show you're smart'. Girls proved more likely to hold a fixed mindset than boys and, when they did so, they were more averse to challenge.

Readers may like to read a case study which analysed the effects of different types of verbal interactions between a teacher and the girls and boys in her class.

How did very young children respond to challenges?

Early studies that investigated the responses of young children (aged seven or less) to challenges found that they generally seemed to remain optimistic and engaged when trying out a new skill, even if it took some time to master. This makes sense, as it is important that young children do not give up easily on such tasks as learning to walk or talk. Readers might like to read a case study showing the persistence of young children on tasks in a supportive environment.

However, later experiments did find evidence of a non-persistent response in children as young as three and a half - and in a sizeable proportion of children aged four to five years. For example, young children were asked to complete four jigsaws: three that were too difficult to complete within the allotted time and one which the researchers ensured the children always completed. The children were then allowed to choose which jigsaw they would like to re-work. Over one third of the children tested chose to re-work the jigsaw they had already successfully completed. When asked why they chose this one, children gave reasons such as "It's the easiest" or "I already know I can do it". Other children chose to attempt to compete a puzzle on which they had previously failed. Both groups of children saw themselves as good at doing puzzles before the experiment and, when tested in a previous session with no time constraints, were similarly successful.

Further experiments explored the children's self-talk, their expectations of future success and their feelings whilst they were doing the puzzles. They found that the children who chose to repeat easy puzzles were far more likely than those who chose challenging puzzles to:

- engage in negative self-talk ('I can't do it; these are too hard')
- try to distract the adult ('Did you ever see Star Wars? That's my favourite movie')
- show lowered expectations of their future ability to solve the puzzles compared with their expectations before the test
- feel less happy during the task (as indicated by facial expressions or by the comments they made).

The parallels with older leraners who lacked persistence in new or challenging situations were striking.

How did criticism affect children's vulnerability or resilience?

Young children made imaginative predictions of how different adults might respond to unfinished tasks in a series of role-play experiments. The researchers used dolls to represent a teacher, mother or father and asked children what each doll might say when they looked at incomplete jigsaw puzzles, series of numbers, toy buildings or pictures. The dialogue imagined by children showing persistent, mastery-orientated approaches differed strongly from that of less persistent children.

The more resilient children role-played little criticism and showed the adult dolls making positive comments and giving constructive suggestions for improvement. They had the adult dolls say things like:

- 'He worked hard but he just couldn't finish them. He wants to try again later.'
- 'That's a very nice picture. Why don't you put some feet on the picture?''You did the best you could. Come and sit on my lap.'
- 'You are a good girl, but you missed the 8.'

Children who, in previous experiments, preferred to repeat the puzzles they could already do, often role-played criticism or threats of punishment criticism from adults. They made the adult dolls say things like:

- 'He's punished because he can't do them and he didn't finish.'
- 'We are throwing this out.'
- 'That's bad work.'
- 'How could you do this? This is not a very good building. I don't like it!'

It seemed likely that the type of feedback adults gave children when they made mistakes could affect their approach to a challenge. So the researchers explored this further. In an imaginary tidying up task, the 'teacher' doll criticised the 'children' dolls in two different ways:

- strategy feedback, eg. 'Your hands are still messy and the table still has paint on it. Maybe you should think of another way to do this'
- criticism that reflected (even mildly) on the child as a whole, eg. 'I am very disappointed in you'.

The children were then tested on their responses to a new situation, in which the doll-children built a house without windows and the teacher-doll pointed out "That house has no windows." The children exposed to strategy-orientated feedback were more positive about the house, generated more constructive solutions to the problem and judged the doll-children more positively than the children exposed to the person-orientated feedback, regardless of whether they originally showed persistent traits or not.

The researchers concluded that general, person-orientated criticism that offered no suggestions for improvement tended to elicit vulnerable responses to failure. They also suggested that young children learned from general criticism to interpret mistakes in terms of whether they themselves were 'good' or 'bad'. Children who received specific, task-focused criticism that implied it was possible to improve through effort or a new strategy tended to locate faults specifically within their work.

What types of praise promoted resilience or vulnerability to failure?

The researchers wanted to explore the impact of different types of praise on children's willingness to persist in the face of a challenge. They noted a widespread belief that giving children copious praise boosted their self-esteem and made them resilient in the face of setbacks. They identified previous research that had found that trait-orientated praise, such as praise for ability in succeeding at a task, could boost performance whilst the children continued to experience success. However, they proposed that children with a belief in innate ability might not cope well when things became difficult.

The researchers used role-play with dolls to model six different types of praise with different groups of young children. Each group of children were exposed during four tasks to repetitions of a particular type of praise. These were:

- group 1 (person centred praise): 'You're a good boy/girl'
- group 2 (person centred praise): 'I'm proud of you'
- group 3 (trait centred praise): 'You're very good at this'
- group 4 (outcome praise): 'That's the right way to do it'
- group 5 (praise for effort): 'You really tried hard'
- group 6 (praise for strategy): 'You found a good way to do it; could you think of other ways that would also work?'

Although each group was equally positive during this first part of the task, the children who had been exposed to person or trait orientated praise became vulnerable when presented with a scenario in which the doll children built a house with no windows. They gave the house and themselves a low rating. The children exposed to the strategy and effort praise proved more persistent and constructive in tackling this setback than those in the first three groups.

Further research with older children found that praise for intelligence also backfired. Pupils who were praised for intelligence subsequently chose performance goals, easy tasks that they could complete correctly, whereas pupils praised for effort opted for learning goals, difficult tasks that could extend their skills. On encountering failure, those praised for ability gave up, whilst the others kept trying and eventually produced the best performance.

The researchers concluded that, if you learned from person praise that success meant you were a good or able person, then you also learned that failure meant that you were a bad or inept person. Person-orientated feedback seemed to instil a sense of contingent self-worth - that a person could feel worthy only when they succeeded and felt deficient or worthless when they failed.

Dweck made clear recommendations about praise. The most helpful forms of praise celebrated students' efforts and strategies, rather than something about them, such as their 'ability'. Dweck proposed that person praise, that appreciated work only as a reflection of some ability, ignored the true merit of what had been accomplished. She suggested it would be better:

- to praise a lovely picture by discussing the choice of colours or formation of textures and images
- to praise a good story by discussing how the student made decisions about the plot and how they came up with interesting characters
- to praise the solution to a maths problem by asking what strategies the student used and admiring the concentration that went into the problem solving.

Readers may like to read the case study about the positive effect of specific praise that provides informative feedback to pupils about their work.

What conclusions emerged from the research?

The findings of thirty years of research in this field by Carol Dweck and her co-researchers led her to conclusions about why some students showed self-defeating behaviours in the face of a learning challenge whilst others remained resilient. She also recommended what we could do about this.

She found that very young children exposed to praise that focused on innate traits, or to general criticism

when they did something wrong, associated success with being 'good' and making mistakes with being 'bad'. This led them to judge themselves according to how they performed on tasks. Dweck recommended that feedback to young children should be task focused, not personal, and should praise effort, strategies and outcomes.

Dweck noted that some students had a 'fixed mindset'. They believed that intelligence was innate and fixed and that it determined their performance on a task to a greater extent than effort or persistence. These students quickly lost confidence, gave up and blamed themselves when they performed badly, regardless of any previous successes. They became averse to the risk of learning and showed self-defeating behaviours, such as avoiding challenges and reducing their level of effort. Other, more resilient, students had a 'growth mindset'. They believed that ability on a task could be improved through effort and trying new approaches. They saw encountering difficulties as a natural part of the process of learning.

Dweck recommended that adults encourage a growth mindset in learners, so that they viewed poor performance on a task as something that could be improved by effort and persistence, rather than as a personal, negative reflection on them.

Dweck's work on the self-talk used by resilient learners led her to recommend that teachers could support learners' persistence by equipping them with problem-solving strategies that were specific to the particular challenge they faced. (Readers can find examples of these in the case studies. She also recommended that teachers explicitly taught learners a) about the need to expend time and effort when learning a skill and b) that initial failure was a healthy sign that a challenge was worth pursuing.

How was the research conducted?

The book upon which this summary is based includes descriptions of the findings of a wide variety of experiments from over thirty years of empirical research. Although sample sizes for specific experiments are not given, the author states that many students were involved in the research. The experiments were clearly repeated on numerous occasions with groups from different geographical areas, socio-economic backgrounds, and ages (including children aged between three and a half and five, primary school pupils, secondary school students and college students).

An appendix details the questionnaires used to measure students' confidence, goal choices and implicit theories of intelligence and personality. Most of these measures were based on Likert scales in which respondents were asked to indicate the extent to which they agreed or disagreed with a particular statement. Confidence was measured by asking respondents to indicate whether a particular statement was 'very true for me', 'true for me' or 'sort of true for me'. The researchers modified these response scales for different age groups.

The researchers paid particular attention to the ethical issues involved in their experiments. All the experiments were designed to leave the subjects with a positive sense that they had learned or achieved something. The experiments with young children used role-play with dolls to avoid directly criticising individuals during the course of the task and the children were offered experiences of success and praise following any experience of difficulty or challenge. Older students who were initially misled as to the purpose of the experiment were debriefed and offered a full explanation of the purpose and findings of the experiments.

A comprehensive bibliography in the book gives references to each study, should readers wish to pursue further detail.

Implications

Teachers hoping to improve levels of motivation and engagement amongst their students might like to consider the following implications.

- Persistent students saw 'failure' on a task as a new point of departure rather than a judgement about them as a learner. How might you help your students develop an incremental view of learning which makes them more inclined to engage with challenge and take risks so as to grow?
- The study found that praise which labelled pupils as 'intelligent' could have an unintentional and adverse effect on their intellectual growth. Could discussing the process of how they created something or reached an answer prove a helpful form of praise for your students?
- Vulnerable students tended to view the need for effort as an indicator of a lack of ability. Could giving students examples of people who obtained success through sustained effort begin to counteract this belief?
- More resilient students remembered and used strategies to help them tackle challenges. What strategies for persistence and success - perhaps through AfL strategies - do you think it might be useful to make explicit in teaching your students?

Leaders may wish to consider the following implications.

- What views of intelligence do you and your colleagues hold? Could discussion with colleagues and collecting evidence about how different views on this topic might affect students' belief in the possibility of improvement prove a fruitful arena for continuing professional development?
- Students who thought their intelligence was fixed tended to struggle in the face of challenge and exhibited self-defeating behaviour. What could be the implications for your students if - through the unintended consequences, for example, of organisational strategies - they are led to label themselves as having a fixed amount or type of intelligence?
- Would it be helpful to review policies that involve identifying particular aspects of ability, like special education needs or gifted and talented, to ensure that the positive aspects of identifying needs and talents aren't undermined by unintentional reinforcing of fixed notions about ability?
- The study offers further evidence of the value of formative assessment that equips students with tools to improve the quality of their work. To what extent might a focus on assessment for learning in your school ameliorate any possible negative effects of strong external pressures to improve students' performance in examinations?

Filling in the gaps

Research builds cumulatively upon what is known and every piece of research uncovers new questions for further investigation, or gaps to be filled. Research also needs to inform practice, so practitioners' interpretation of any gaps and their follow-up questions are important. Some of the questions we think would be useful to explore are:

- What influence do parents have on a student's view of intelligence?
- Can educators affect the parents' influence?

What is your experience?

Do you have any evidence about initiatives aimed at improving students' motivation or resilience in the face of difficulties? Do you have action research or enquiry based development programmes running that explore, for example, the effect of different types of praise? We would be interested to hear about examples of effective initiatives promoting student persistence and resilience.

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Case studies

We have chosen five case studies, drawn from independent, classroom-based research to illustrate aspects of the research reported in the RoM summary. The first case study explored ways in which students managed or were affected by frustration. The second showed the positive effects of rewarding participation and effort in a 'no blame' context. In the third case study, a primary school teacher explored how different patterns of interaction between her and the girls and boys in her class tended to reinforce gender stereotypes and then described what she did about this. The nursery teachers in the fourth case study explored how very young pupils could be supported to tackle challenging problems in the context of outdoor education and the final case study investigated the impact on pupils of different types of praise.

Enhancing student engagement

We chose this study because it illustrated a variety of student responses to a new challenge, including the frustrated and persistent responses that Dweck found so often in her research. It also showed how encouraging persistence and suggesting strategies for improvement helped students to re-engage in the task after frustrating experiences of failure.

The study took place with a group of 40 Year 8 students (aged 13-14) from a large, urban comprehensive school. The chosen students had difficulties solving non-verbal reasoning tasks and many of them disengaged from learning during normal lessons. The aim of the study was to explore ways in which students managed, or were affected by, frustration during a learning task. Two groups of 20 students had five 90-minute lessons in circus skills. They all had to learn tight-rope walking and juggling with three balls and, once these skills were mastered, could try out one other skill, such as spinning plates, diabolo (keeping the diabolo moving along a string or in the air), rolla-bolla (balancing on a small platform with a ball underneath) and flower stick (keeping a small stick spinning in the air by hitting it with another stick).

The pupils found the skills hard to learn. Improvement was slow and pupils failed frequently. When they did so, many became frustrated. Students showed three different responses:

- about 40 per cent disengaged aggressively, becoming agitated, swearing or behaving defiantly - 'When are we going to do something different? This is boring. I never wanted to do it anyway.'
- about 40 per cent gave up and withdrew passively
- about 20 per cent kept trying.

The students who disengaged aggressively unsurprisingly drew a huge amount of attention from adults. Discussions with the students showed that these responses mirrored behaviour in the classroom. The students who became passive described how they would avoid confrontation with staff. These students were often quiet and undemanding. They did not disrupt others' learning because they did not want to draw attention to the fact that they themselves were not engaging. To re-engage with the activities, these students needed support from peers or adults. The students who disengaged passively were easier to notice in this context of practising a physical skill, as their lack of engagement could be seen. They would have been harder to spot in the classroom.

The teachers helped the students to develop strategies to become more successful. They asked students to think about why they had not succeeded and what they needed to do in order to succeed. The types of strategies the students developed ranged from the general - concentrate more, practise more and focus - to the specific - walk slower on the tightrope, move more smoothly and improve balance. The construction of these personalised, achievable targets helped to promote eventual success.

When they achieved success, the students who had initially persisted or passively withdrawn tended to celebrate in a low-key way, with smiles, or a comment in their diaries. Some of the initially more aggressive students were more flamboyant:

'Take a picture of me! Look, look, I can do it now. Watch me, I've got it sussed!'

During the project, students completed a structured reflective diary and this helped the teachers to collect evidence about what was happening and to highlight any patterns that emerged. The teachers interrupted unhelpful avoidance techniques, whether these were clearly obvious (aggressive frustration) or more subtle (passive withdrawal). They supported the students to persist in the face of a challenge by helping them to identify useful strategies for improvement. The teachers aimed to remove the threat of failure to students and to help them redefine success as a willingness to take risks and engage in activities.

Reference: Farquhar, K., Sawyer, M., Cook, C., & Smith, P., (2006) Enhancing student engagement. National Teacher Research Panel summary. Available at: www.standards.dfes.gov.uk/ntrp/publications/

Improving science achievement by raising self-esteem

We chose this study because it showed the positive effects of focusing students on improving their levels of effort. When teachers rewarded students' effort and participation, this led to improvement in the students' attainment.

The study took place in an urban secondary school in a deprived area. Nearly 80% of students had reading scores at least two years below their chronological age on entry to the school. The study focused on groups of bottom set science students as they moved from Year 8 through Year 9. It aimed to boost self-esteem, oral contributions during lessons and overall attainment in science by using a reward system. The teacher used a wide range of additional strategies for improving student participation in the lessons.

The teacher aimed to consistently reward attempts to answer questions in science lessons by awarding a sticker. The collection of twenty stickers by any student led to a merit award; forty led to a certificate and a letter home and sixty stickers won the student a prize, a special certificate and a letter home. The teacher used the stickers frequently, especially for students who were initially reluctant to answer, and he gave double rewards for scientific answers. He aimed to encourage all students to participate and to think and attached no blame to 'wrong' answers. He accepted all contributions, no matter how 'correct' they were. If students did not understand, he took responsibility for this, saying, "I haven't explained that very well", rather than, "You weren't listening".

The teacher encouraged the students to talk to one another, by setting oral and explanation tasks in every lesson. He encouraged work in pairs and groups. Every lesson had a short period of paired work in it. He demonstrated good listening skills in order to teach students how to work well in pairs. He encouraged students to give positive feedback to one another. He taught them to ask for and to offer help to one another. He varied the pace and tasks in lessons and set clear learning objectives. These were expressed by using phrases such as: "By the end of the lesson, you should be able to/know/understand..." He also encouraged students to identify their own and others' strengths and to set themselves personal targets for improvement.

The students involved in the project greatly increased their involvement in question and answer sessions. They remembered the key scientific facts they had studied and their scores on module tests improved. Although the students' scores on a test of general self-esteem did not show a significant improvement, they made many positive comments about their progress and ability in science as the study progressed. For example, students made comments such as:

- 'Science is my best subject.'
- 'She's a super scientist like me now, sir.'

Students were able to remember the learning strategies outlined to them during the project. They also showed an improved attitude to science and there was a great reduction in disruptive behaviour during the course of the project.

Reference: Dunsmore, A. (1997) Improving science achievement by raising self-esteem (PDF, 140kb). Published by the Teacher Training Agency as part of the Teacher Research Grant Scheme 1996/97.

Teacher talk with boys and girls

We chose this case study because it investigated the way in which girls' and boys' experiences of praise and feedback in the primary classroom can differ.

The findings link to the main study's findings about girls' and boys' different responses to challenge after their transfer to secondary school.

The study took place with 31 Year 5 pupils (aged 9-10) in a state maintained primary school. The teacher

asked a non-teaching assistant and pupils to tally the number of different types of verbal interactions she had with the boys and girls in her primary school class during the course of one week. She also tape-recorded some sessions. The teacher noted several differences in how she praised and gave feedback to boys and girls.

The first week's observations made it clear that, in this classroom, boys received more verbal teacher interventions than girls. These tended to be given in public, in a whole class context. When the teacher spoke to girls, she tended to give feedback more quietly, in private. Comments from the teacher to boys tended to be longer and more detailed, as well as more frequent. Several different types of interactions were identified.

The boys received more instructions than the girls. These were often lengthy and precise and explained why something was being asked of them. The boys were asked more questions than the girls, but the girls often answered questions more accurately and precisely. The boys asked more questions than the girls and had more of their questions answered. Girls' questions tended to relate to set tasks and activities; boys questions were often personal questions, asked during both formal and informal times of the day.

The boys received about four times more reprimands than the girls. Many of these were lengthy, explanatory and given in a whole class context. Boys and girls received similar amount of 'helping' interventions, which were usually given in the context of individual or small group work. It seemed that boys and girls received similar amounts of private attention. Girls received more 'checking' interventions, which ensured that the girls were getting on satisfactorily with their work, but which tended to be cursory.

Boys received more 'miscellaneous' comments, which tended to be informal and friendly.

The type and frequency of praise given to girls and boys also differed. The girls often received brief praise for behaviour such as sitting still, being ready and being quiet. They received more of this type of praise than the boys. The praise given to boys was intended to encourage and enthuse them in their work. It was longer and more complex than the praise for good behaviour. Boys received this type of 'personal' praise more often than did girls.

The teacher also discovered that, whilst girls' perceptions of the number and type of teacher comments they received were in line with the research findings, boys perceived the girls to receive more teacher attention. This mismatch suggested that the boys' expectations of teacher intervention were higher than those of the girls.

The teacher developed different ways of responding to pupils as a result of her investigation. She dealt with most questions privately, rather than in a whole class context, introduced a three-chance tally system to record reprimands privately and tied to make her expositions to the whole class as precise and non-repetitive as possible. After a two week trial, the pupils listened more carefully, worked on their tasks for longer, sought attention less than before and seemed much calmer. The pupils agreed at the end of the trial period that they preferred the new system and it was maintained until the end of the school year.

Reference: Addy, M., Teacher talk with boys and girls.

Young children's persistence in a supportive environment

We chose this study because it illustrates how adults built an emotionally supportive and non-judgemental environment in which very young children (aged 3 to 4) were able to show sustained concentration and persistence on challenging tasks. The children attended an inner-city, LEA maintained nursery school with a broad ethnic mix amongst both children and staff. This outdoor education project took place in the grounds of the nursery, as well as an orchard and a country park, which extended the facilities that could be offered to the children.

The children used natural materials to make dens and their teachers and another adult with expertise in outdoor education used this as an opportunity to encourage and study their creativity in approaching design

and construction problems. The adults and children worked together in an equal partnership. This helped the children to work independently and confidently. Rather than laying down rules, for example, about the safe use of cutting tools, adults described or demonstrated safe practice as and when each child needed to know.

Children were allowed great freedom to explore. Once, a child jumped in a puddle excitedly. She then looked guiltily at the adult following her, but was reassured when the adult smiled and jumped in, too. Children decided for themselves how long they wanted to spend on a particular task. They proved remarkably persistent, spending long periods of time on activities of their choice, such as making woven wooden panels to decorate their dens, or transporting logs from one place to another. The children often chose to return to the same activity at the start of a new session if they had left it unfinished on the previous occasion.

The adults in the project maintained an often-silent presence and allowed the children to work at their own pace on tasks of their choosing. They were always on hand to support and help the children if their help was needed, but they held back from giving advice or instructions. The sessions (which were recorded) were characterised by long periods of silence, in which the children worked confidently on their self-allotted tasks, reassured by the presence of the adults.

The study found that the attitudes maintained by the adults involved in the project affected the children's attitudes and boosted their self-confidence. The adults' belief that the process was at least as important as the outcome of the children's efforts enabled them to support each individual child's choice of activity, regardless of whether it was obviously productive or not. The adults' confidence helped the children. Both understood that failure was part of the process of learning and that they were free to fail.

Learning happened tangentially. For example, the children learned different ways of tying knots when making each den roof. They pursued this interest in the classroom, learning many more knots, some of which were quite intricate. The teachers found that, once a child's interest was caught, even children who usually had a short concentration span could persist with an activity for an extended period of time.

Reference: Magraw, I. and Dimmock, E. (2006) Silence and presence: How adult attitude affects the creativity of children. National Teacher Research Panel summary. Available from: www.standards.dfes.gov.uk/ntrp/publications/

The usefulness of specific praise

We chose this case study because it links to the main study's findings on helpful forms of praise. The study investigated the impact of different types of praise. It showed that praise that provided informative and specific feedback on the processes and outputs of pupils' work helped to promote effort, persistence and progress. It involved four teachers in two English primary schools and 109 Year 4 pupils aged eight to nine years.

The researchers introduced the teachers to two different types of praise, which they called positive praise and specific praise. The teachers then used one of the two types of praise during daily numeracy lessons with their class. Each type of praise was used by two of the teachers.

Positive praise expressed approval, affirmed a correct answer, or gave general, positive reinforcement for aspects of behaviour, for example, 'well done', 'nice job' or 'clever girl'.

Specific praise expressed approval and also explicitly linked the praise to actions taken by the pupil. It described precisely the behaviour or aspect of work that was being praised, for example, 'it is clear that your essay was thoroughly researched and it provides quality evidence to support your conclusions'.

The study found that both types of praise increased the time pupils spent concentrating on their work and seemed to make them generally happier. In addition, the specific praise had the following positive effects on

pupils:

- they became more aware of what made them successful at tasks
- they became more capable of dealing positively with failure when they received explanations about successful academic performance
- they became more open to challenge and willing to attempt difficult tasks
- they became more settled during group work.

The teachers involved in the study reported that they had become more aware of the praise they gave and that they praised pupils more frequently. Although they found it easier to praise groups than individuals, the study helped them pay more attention to precisely who and what they were praising.

Reference: Chalk, K & Lewis, A. B (2004) Specific Praise Improves On-task Behaviour and Numeracy Enjoyment: A study of year four pupils engaged in numeracy hour *Educational Psychology in Practice* Vol. 20 (4), pp.335-351

An online summary of this study is available at: http://networkedlearning.ncsl.org.uk/knowledge-base/bibliography/research-summary-praise-be-the-effects-of-praise-on-student-behaviour.doc
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Further reading

What else might I enjoy reading?
Dweck, C. (2006) Mindset: the new psychology of success. London: Random House.

Related resources
http://www.standards.dfes.gov.uk/research/themes/pupil_grouping/?digest=all
Research Digests: Pupil grouping and organisation of classes
A range of resources for teachers on classroom management, including suggestions and examples of effective use of praise.

Developing students' motivation
http://www.educationworld.com/a_issues/chat/chat010.shtml

Summaries of research

Research Digests: Motivation
http://www.standards.dfes.gov.uk/research/themes/Motivation/?digest=all

http://www.standards.dfes.gov.uk/research/themes/Mathematics/?digest=all
Research Digests: Mathematics
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Appraisal

Robustness

Carol Dweck's book summarises and synthesises around 30 years of research into what motivates people to achieve, and what holds them back. Her studies often involved over 100 students, with participants ranging

from pre-school through to college, and she repeated her experiments on numerous occasions with groups from different geographical areas, socio-economic backgrounds and with different age groups. It is clear that she paid close attention to ethical issues. All her experiments were designed to leave the participants with a positive sense that they had learned or achieved something.

Although the book is based on experimental research and encompasses much data, Dweck does not elaborate on the statistical results of the individual studies and gives only brief details of the methodology she used each time. But she does include a substantial section of references to the original studies, and provides some of the questionnaires she used to measure students' confidence, implicit theories of intelligence and personality in an appendix.

Dweck found that students' self-theories about intelligence have a profound influence on their motivation to learn. Students who hold a "fixed" theory (around 40 per cent of students) are mainly concerned with how smart they are - they prefer tasks they can already do well and avoid tasks that involve making mistakes. In contrast, students who believe in a "growth" theory of intelligence (around 40 per cent of students) want to challenge themselves to increase their abilities, even if they fail at first. Around 20 per cent of students are undecided and students do not necessarily hold the same theory across all disciplines. Dweck's various studies showed that it is possible to change students' beliefs towards a growth theory of intelligence, whatever their age, (by teaching them to concentrate on effort and learning processes in the face of obstacles), and that doing so can make a big difference to their achievement.

Relevance

Dweck's research about intelligence and motivation, and how they are variously influenced by fixed and growth mindsets, is highly relevant to all teachers - from teachers trying to help under performing and low achieving students or support gifted and talented students, to teachers concerned about students' dip in performance on transfer to secondary school, and sports teachers keen to help students reach higher levels of achievement. Dweck's incremental view of learning fits in with assessment for learning practices (such as self- and peer assessment) which enable students to improve, and thinking skills interventions designed to accelerate students' development. These strategies show students that success depends on what they do and how they can do it better, not on their innate ability or IQ.

Applicability

Dweck's findings suggest that teachers should help their students to develop an incremental view of learning, to make them more inclined to engage with challenge and take risks that will enable them to grow. Her findings suggest the importance of teachers presenting students with challenging tasks and stressing to students how learning takes effort, and that the need for effort does not indicate a lack of ability. They also suggest the importance of encouraging students to remember and use strategies that will help them to tackle challenges. The way teachers praise their students will be critical. Teachers will need to avoid giving 'person orientated' praise (such as, I'm proud of you' or 'you're good at this') because it suggests that success is due to personal attributes and teaches students to interpret difficulties in terms of their personal weaknesses. It will be better to give 'process orientated' praise (such as, 'You tried really hard' or 'That was a good way to do it') because it will teach students to interpret setbacks in terms of lack of effort or inappropriate strategies, allow every student to earn praise, and will help to sell the idea that esteem comes from striving and from the use of effective strategies. 'Task oriented' praise (such as, 'You've made hardly any spelling mistakes this time') will be helpful too.

Writing

Dweck's explanation of her research is highly readable. It is written in easily understood language, with little jargon or technical detail.
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