

Hidden talents: the overlooked children whose poor verbal skills mask potential

Report 2017



INTRODUCTION

According to the Royal Academy of Engineering, the UK will need an extra one million additional engineers and technicians by 2020. Yet as this report makes clear, our schools contain sizeable numbers of children who should have a natural affinity for science and engineering but who aren't performing as academically as they could because poor verbal skills are masking their talents.

Students who are highly spatial thinkers – those who think first in images – tend to excel at STEM subjects and indeed often go on to have successful careers as scientists, mathematicians and engineers, according to US researchers. Our analysis of last year's GCSE grades in England also finds that those children who are both spatially and verbally able score highly in science, mathematics and design and technology.

However, the analysis also shows that those children who have high spatial ability but poor verbal skills perform far less well. This cohort equates to approximately 30,000 children in every year group – many of whom would make excellent scientists, technicians and engineers.

Interestingly, there is little gender difference in spatial ability scores. I was lucky – I had a decent balance of spatial and verbal reasoning skills, and could use both to establish my career in engineering at British Aerospace. Yet only 10 per cent of the engineering sector is currently female – and, when I was studying engineering at university, I was one of only seven women in a class of 120. Imagine how that gender imbalance could be diminished if our education system was more adept at identifying and encouraging spatially talented female students at an early age.

Unfortunately, the high verbal bias of much of the school curriculum only serves to mask much of this hidden potential. Fortunately, there are measures and strategies schools can adopt to help identify and nurture it and through our contacts with so many schools we know there are great examples of students with these particular talents getting great support. Elsewhere in this report experts explain what steps teachers can take to redress the balance. I am confident they will, because as things stand, those 'hidden talents' represent wasted potential that the country can ill afford to lose.

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HIDDEN TALENTS:

THE OVERLOOKED CHILDREN WHOSE POOR VERBAL SKILLS MASK THEIR POTENTIAL



One of the most interesting findings from a huge survey of 400,000 students carried out the US over 50 years was that youngsters who scored highly in spatial tests were much more likely to study STEM subjects at university and go on to be scientists and engineers¹. Spatial thinkers, who think initially in images before converting them into words, tend to have good visual imaginations and commonly have been “building things since they were very little”². They can more precisely be defined as having “the ability to generate, retain, retrieve and transform well-structured visual images”³.

Unfortunately, significant minorities of children with high spatial abilities also have poor verbal skills. As so much of the curriculum and testing regimes are heavily biased towards literacy and language skills, this places them at a distinct disadvantage.

Compounding this issue is the fact that these children are often reluctant to communicate in class and that teachers, as excellent communicators, tend to have a verbal bias. The upshot is that many spatially gifted children often go unrecognised by an education system that readily identifies their limitations but overlooks their talents.

This report by GL Assessment seeks to assess how big of a problem this is in our schools, what are the implications and what can be done by teachers to help spatially able children succeed.

The findings

An analysis of more than 20,000 pupils, conducted by GL Assessment, has revealed that well over **four-fifths of children** who had both high spatial and high verbal abilities achieved A*-B across all STEM subjects and English at GCSE last year⁴. But children with high spatial intelligence and poor verbal skills – approximately **4%** of the school population or **30,000 children** in each year group in the UK – significantly underperformed.

At English GCSE last year, for instance, **81%** of high spatial learners with good verbal skills achieved an A*-B. But among children with the same spatial ability but with poor verbal skills only **24%** managed to achieve an A*-B, a **57 percentage-point gap**, and **over a third (36%)** failed to pass, scoring a D or below.

Children with high spatial abilities but poor verbal skills constitute approximately

4%

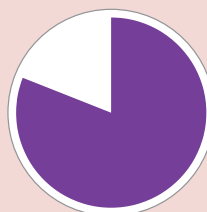
of the school population or

30,000

children in each year group in the UK

In last year's English GCSE, the percentage that achieved A*-B

High spatial learners with good verbal skills



81%

Same spatial ability but with poor verbal skills



24%

A 57 percentage-point gap

What is striking, however, is that the gap in exam performance is not confined to English or the humanities. There is also a significant, if less pronounced, divergence in maths and science, subjects in which high spatial ability children tend to do much better.

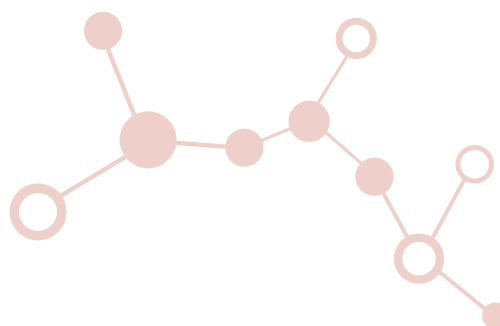
In last year's maths GCSE, for instance, **89%** of children with good spatial and verbal abilities achieved an A*-B. Conversely, only **52%** of those with high spatial skills but poor verbal skills achieved the same, a **37 percentage-point difference**. **13%** of students with high spatial skills but poor verbal skills failed to obtain a good pass (A*-C) in maths GCSE compared to only **1%** of high verbal and high ability children.

In physics GCSE, **86%** of children with good spatial and verbal abilities achieved an A*-B compared with **58%** of their verbally challenged peers. In chemistry the respective figures were **84%** and **62%**, and in biology **87%** versus **56%**. Children taking a single core science GCSE diverged wildly: **74%** of children with good spatial and verbal abilities achieved an A*-B compared with **24%** of those with poor verbal skills – a **50 percentage-point difference**. Almost **two-fifths** of the latter group (**38%**) failed to achieve a good pass in core science compared to only **one in 20** high spatial and verbal ability students (**5%**).

The same pattern can be observed in design and technology subjects, in which spatially able children tend to do well. In graphic products GCSE, **61%** of children with good spatial and verbal abilities achieved an A*-B compared with **29%** of those with low verbal skills. In resistance materials the corresponding figures were **71%** and **29%** respectively and in textiles it was **87%** and **35%** – a **52 percentage-point difference**.

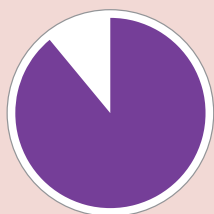
GL Assessment's findings mirror research in the US. Professor Jonathan Wai of Duke University has warned that students who have high spatial but relatively low verbal scores are likely to be "missed as being talented" because traditional schools systems "value students who are good at reading, writing and doing math" (see page 8).

Professor Wai points out that as a consequence we are failing to identify those with highly spatially talents, like Elon Musk (CEO of SpaceX and Tesla), who have incredible visual imaginations and tend to excel at STEM subjects, particularly at engineering. "The question we need to ask ourselves is why we are not doing a better job of finding spatially talented kids at an earlier age and doing everything we can to engage and enhance their incredible ability to envision and engineer our future. What innovations have we already lost because of this?"



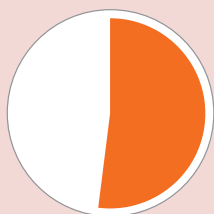
In last year's Maths GCSE, the percentage of students that achieved A*-B

Good spatial and verbal abilities



89%

High spatial ability but poor verbal skills

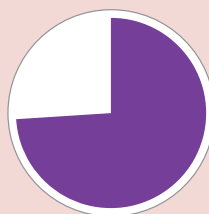


52%

A 37 percentage-point gap

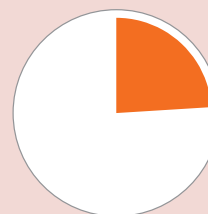
Students taking a single core science GCSE – percentage that achieved A*-B

Good spatial and verbal abilities



74%

High spatial ability but poor verbal skills



24%

A 50 percentage-point gap

Conclusion

The figures from our survey suggest that the hidden talented are just as likely to be overlooked in England as they are in the US. According to our estimates, **4 per cent** of the school population can be classified as highly able spatial children with poor verbal skills – approximately **30,000 children** in each year group.

Our education system as it stands does little to identify or develop the innate talents of those children. The curriculum and testing regimes are overwhelmingly biased towards oracy and literacy, which many spatially able children with poor verbal scores find challenging.

Elsewhere in this report, John Dyer and Lyndsay MacAulay from Liverpool Life Sciences UTC explain how teachers can practically identify and develop children who may have unrecognised spatial ability and consequently a hidden talent for science (pages 10-11), while Helen Wollaston, the Chief Executive of WISE, writes about promoting female talent in the classroom (page 9).

There are strategies and assessments of cognitive ability that can help. The worry is that if schools do not adopt these, the country will continue to lose the opportunity to develop many thousands of scientists and engineers it so desperately needs.



Footnotes

1. Project Talent longitudinal study, conducted on 440,000 American high school students by American Institutes for Research from 1960 onwards
2. Dolly Singh, former head of talent acquisition at Space-X, quoted in *Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future*, by Ashlee Vance, 2015
3. "By neglecting spatial ability, how many Elon Musks have we missed?", Professor Jonathan Wai, *Quartz* magazine, July 2015
4. The analysis was based from a pool of more than 20,000 secondary school students who completed *Cognitive Abilities Test (CAT4)* in Years 7 to 9 and completed their GCSEs in 2016. Students with high spatial scores (within the top 25% of spatial scores nationally) were selected from this pool and the GCSE results for these high performing spatial students were compared between the following two groups:
 - a) those with high verbal scores (within the top 25% of verbal scores nationally)
 - b) those with low verbal scores (within the bottom 40% of verbal scores nationally)



WHAT IS A SPATIAL THINKER?

Sue Thompson, GL Assessment's senior publisher, explains what spatial thinking means and the benefits of tapping into spatial skills from an early age

Spatial thinking is acknowledged by psychologists as a key element of 'general ability', one of the basic mental tools we all have and need to use in learning and living.

However, many children are either unaware that they have a strength in this basic mental ability or it has been dismissed as merely them being 'good with their hands' or 'gifted at art'. Research has shown that spatial learners often flourish in science, technology, engineering, mathematics as well as art (STEM), and that developing young people's spatial thinking can increase achievement in these important subjects.

A spatial thinker is simply someone who thinks most easily by using images and only afterwards converts these thoughts to words; an individual with a capacity for mentally generating and transforming visual images. According to Dr Jonathan Wai, psychologist and research scientist at Duke University, North Carolina, schools are neglecting such learners for three main reasons:

- Most teachers do not have a spatial ability bias. Alex Knapp, Associate Editor at Forbes Magazine writing about science, technology and culture, has suggested that those drawn to education are those most comfortable with verbal thinking. This is not surprising, given that oral communication is a key element of teaching. Thus teachers identify with students who have similar strengths to their own and find it difficult to appreciate that others have very different strengths and weaknesses.
- Spatially talented people are not very vocal. Both Edison and Einstein were spatial thinkers, known to be poor talkers who spoke rarely and even then with much hesitation. As those who have a high spatial ability tend to be less vocally fluent, there is a suggestion that they are less likely to speak out about their dissatisfaction with the school system.
- Standardised tests conducted in schools do not typically include spatial measures¹. Therefore, if schools are not testing for spatial ability, then they are less likely to pay it adequate attention.

The case for spatial thinking

Research has shown how neglecting spatial abilities could have widespread consequences. There is evidence that those with relatively strong spatial abilities tend to gravitate towards and excel in fields such as physical sciences, engineering, maths and computer science, as well as art and design.

Nora Newcombe², Professor of Psychology at Temple University, Philadelphia, explains that numerous studies indicate spatial thinking is central to STEM success. She identifies Project Talent³ as one of the most important. The study followed approximately 400,000 American pupils over a 50-year period. It found that those who had high scores on spatial tests in high school were much more likely to major in STEM disciplines and go into STEM careers than those with lower scores. Professor Newcombe points out that spatial thinking is not a substitute for verbal thinking. Nor is it a learning style. She believes instead that teachers should be trying to provide students with content knowledge, experiences and skills that support development of both verbal and spatial thinking.

The significance of STEM

In September 2016, the Daily Telegraph posted an article⁴ promoting its 2017 STEM Awards which stated:

The strength of STEM is (also) important to Britain's prosperity, according to a new study by the Royal Academy of Engineering. The respected organisation's research found a link between countries' economic development and their engineering prowess.

"Engineers have historically played an important role in driving economic and social development, and continue to do so, by designing and delivering systems that facilitate education and healthcare, enhance quality of life, and help to eliminate global poverty," says Dr Hayaatun Sillem, the Academy's Deputy Chief Executive.

In the same article Warren East, Chief Executive of Rolls Royce, described STEM as “critical to the continued success of the UK”.

“STEM subjects are vital to us. They are the fuel that powers our innovation,” he adds. “Every day our thousands of researchers, engineers and technicians use the principles they first began to learn in school and put them into practice creating some of the most complex machines and systems ever built.”

Many organisations are using outreach programmes and social media to reach students and their parents to raise awareness about the opportunities and benefits of studying STEM subjects but will this be enough to reverse the anticipated 60% shortfall in STEM professionals in the very near future?

Identifying spatial thinkers

Another essential element to improving the take up of STEM subjects is identifying spatial thinkers early and tapping into their talents.

Steve Walters, Deputy Head at Newport Girls’ High School, explains: “Everyone learns in different ways and perhaps at times teachers over focus on verbal/written teaching styles which can restrict the progress of some learners. Rethinking how we approach some topics potentially opens up increased progress rates, simply by use of visual stimuli. I also find revision becomes easier if we use pictures to support the learning of different concepts.

“Thinking more spatially makes more fuller use of our brains, too, as it encourages more creativity. Learning becomes less dry if we use the full range of visual-auditory-kinesthetic materials and take up spatial opportunities.”

We know of others following the same path in understanding that learning should be tailored to the individual, taking into account pupils’ learning preferences and strength. As a society it is important that we change the way intelligence is defined by schools, parents and our culture in general. We also need to identify spatial learners early. By making spatial learning more explicit, educators can appreciate when and how it takes place.



What can you do?

- Consider introducing a means of identifying spatial learners
- Find out what subjects children find easy or hard and make sure they are aware of their own learning profile
- Develop specific pedagogies for spatial learning which, in turn, will benefit all learners
- Offer differentiated learning so pupils can choose how they do a task and do not suggest there is only one approach that is ‘correct’
- Do not assume that the way you think and what you find easy or hard will be matched by pupils. An inarticulate, low-achieving child may complete intellectual tasks of a spatial nature that you find difficult, with great ease
- Encourage children to try to develop their weaker areas, as it will help them cope with life and work more effectively
- Ensure they know the implications of strengths in particular types of thinking for likely success in different career areas and disciplines. Good spatial thinking may imply a potential for maths, physics, architecture or engineering, not just construction trades and art
- Encourage children to look at subjects and careers beyond gender-stereotyped ones, as much spatial potential is currently wasted in girls and verbal potential in boys.



Footnotes

1. The exception is the *Cognitive Abilities Test 4th Edition* which is widely used in the UK and internationally
2. <http://www.cla.temple.edu/psychology/faculty/nora-newcombe/>
3. <https://www.projecttalent.org/>
4. <http://www.telegraph.co.uk/education/stem-awards/stem-hq/stem-disciplines-fun-and-fundamental/>

BY NEGLECTING SPATIAL ABILITY, HOW MANY ELON MUSKS HAVE WE MISSED?

By **Professor Jonathan Wai**, a researcher at the Duke University Talent Identification Program and Case Western Reserve University

Peter Thiel famously said of the future:

“We wanted flying cars, instead we got 140 characters.”

As innovative as Twitter might be, it pales in comparison to engineering feats that could truly transform our future. Think, for example, of the things Elon Musk has been dreaming about: the Hyperloop, a Mars colony, or a new energy source.

In his new biography *Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future*, Ashlee Vance describes Musk as a “modern day alloy of Thomas Edison, Henry Ford, Howard Hughes, and Steve Jobs” – someone who has a mind like a computer and the ability to endure failure in his quest to change the world through his companies. Vance, like a literary paleontologist, unearths aspects of Musk’s personality demonstrated since childhood, and the parallel traits he values in employees. As Dolly Singh, former head of talent acquisition for Space-X, told Vance:

“We were looking for people that had been building things since they were little.”

In essence, these are driven people who have extraordinary spatial talent, defined as “the ability to generate, retain, retrieve, and transform well-structured visual images.” But the people who have made it through the talent filter of one of Musk’s companies are those who succeeded in overcoming many earlier educational and occupational hurdles. They are the students who had enormous opportunity to develop their spatial talent and succeed in traditional school systems that value students who are good at reading, writing, and doing math. For some of those spatially talented students that made it, they may have had parents to encourage those visual talents, even if school did not. They also may have had extremely high math and verbal abilities in addition to their high spatial ability, which allowed them to perform well in school even those weren’t their primary strength.

Consider this: Ever since you were a kid, can you recall taking a standardized test in the US that didn’t have a verbal or math section? Pretty much all of them have math, science, English, reading, and maybe writing sections. What’s missing are measures of spatial visualization.

In some of my research with colleagues David Lubinski and Camilla Benbow, we demonstrate that spatial talent is linked with success in STEM disciplines – especially areas such as engineering. We also illustrate that when standardized tests include primarily verbal and math measures, the large group of students who are high on spatial but relatively lower on math and verbal talent are likely to be missed as being talented, whether that takes the form of an official talent search or a more personal judgment made by a teacher, educator, or parent. A full 70% of the top 1% in spatial reasoning did not make the cut on the top 1% of either math

or verbal reasoning within a population level sample, showing that there is a large pool of students who are spatially intelligent but not as strong in traditional testing areas.

Talent cannot be developed properly if it is not identified properly, as illustrated in some of my research documenting the importance of a consistent educational dosage over time for eventual adult achievement. For spatially talented students, this might consist of engaging in robotics competitions or being taught in ways that draw out their visual imaginations. The maker movement may be especially helpful for this traditionally neglected subpopulation.

In fact, Musk himself founded Ad Astra, a school for his own kids and Space-X employees that may focus on an education more suited to spatially talented kids. As Singh told Vance about the Space-X hiring model:

“The object is to find individuals who ooze passion, can work well as part of a team, and have real-world building experience bending metal.”

Musk’s childhood was difficult, which led some of his colleagues to note that – beyond his brilliant mind and willingness to work insane hours – is his capacity to endure pain. We marvel and idolize someone like Musk who has overcome failure to become a success, yet we forget the many potential Musks who could have been, but who simply didn’t have the opportunity to develop their talent.

The question we need to ask ourselves is why we are not doing a better job of finding spatially talented kids at an earlier age and doing everything we can to engage and enhance their incredible ability to envision and engineer our future. What innovations have we already lost because of this? Perhaps if we do decide to help spatially talented kids, we might get something much more incredible than flying cars – and definitely something more useful than 140 characters.

This article was published in Quartz magazine in July 2015.

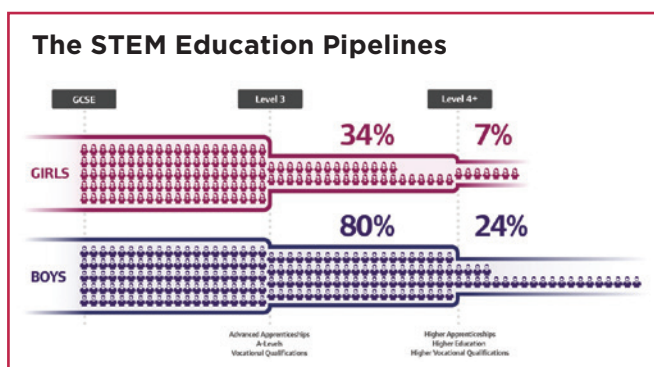


GIRLS NEED TO SEE IT TO BE IT

By **Helen Wollaston**, Chief Executive, WISE



The latest statistical analysis by WISE, illustrated below, shows that only 7% of the girls who take STEM GCSEs will go on to qualify at Level 4 in a Core STEM area, which is drastically lower than the 21% of boys who will leave education with these qualifications. This is 50,000 talented girls a year turning away from a future which offers better than average pay, world travel, an opportunity to change the world and even more significantly – a sector which is crying out for skilled people. These numbers represent a real risk to the future STEM labour force in the UK and will likely exacerbate the current skills crisis – currently standing at 69,000 recruits a year.



Compare this to data which shows us that 51% of early hires in IT in India last year were women and we start to see what is possible. Jobs of the future – the best paid ones – will require technology skills. We mustn't let the next generation of girls lose out. We mustn't let the UK lose out.

So, what can we do to make a difference? There is no quick fix solution unfortunately as change is needed at every stage in the pipeline from classroom to boardroom. As educators, you can however make immediate changes to how you introduce the idea of a STEM career to girls and help to redress gender balance in the sector.

Who do you invite into your school to get girls excited about potential future careers? If you are lucky enough to enjoy hearing from a CEO or maybe even an astronaut the young audience will no doubt be impressed and they may even be inspired. But will they aspire to be that person or will it feel like too much of a mountain to climb?

We can all agree that positive female role models are important if we are to transform some of the preconceptions that persist about who becomes a scientist, technologist, engineer or mathematician. Importantly, WISE recommends that the most powerful role models for school-aged girls are young women not that much older than themselves who are living lives that they can aspire to and actually picture themselves living. They need to see it to want to be it.



Practical action:

- **By giving girls access to inspiring role models and showing them roles they can aspire to.** A great place to start looking for role models is the WISE Awards where every winner has an incredible story to tell about their job and their journey. Use a fresh approach: focus on introducing girls to the types of people who succeed in science, technology and engineering rather than concentrating on the jobs themselves.

Have you ever thought about the language you use when describing potential future careers to girls? Evidence proves that the vast majority of girls self-identify using adjectives: if you talk to girls about a career where being 'good at maths' is an advantage this would typically not attract them, however if you talk about the same career and refer to solving problems as 'being creative' many more will sit up and take notice. Frequently girls say they want to do a job where they can make a difference to something they care about. Rather than promote science or engineering careers as such – talk about how they could save lives, improve the environment, work in the arts or media – if they have maths, science or computing qualifications.

Practical action:

- **By your use of language.** Train to deliver the People Like Me resource, specifically designed to help teachers to use the natural tendency of girls to articulate their self-identity using adjectives and to show them that people like them are happy and successful working in careers in STEM.

Who do you know that can help you to make a difference?

Look at the women in your network and maximise your contacts: parents, governors and local businesses are all valuable assets – ask them the question, do you work in STEM? Will you share your passion with the girls at our school?

Practical action:

- **Invite local engineering and technology employers into your school to inspire the students.** WISE companies are keen to help. Many have outreach volunteers already trained to use the People Like Me resources. Have a look at the A-Z list of WISE members here on our website and reach out to the ones in your area.

For more ideas and to join our network please contact WISE:

www.wisecampaign.org.uk

info@wisecampaign.org.uk

[@thewisecampaign](https://twitter.com/thewisecampaign)

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HOW TO SPOT THE STUDENT WITH A HIDDEN TALENT FOR SCIENCE

By **John Dyer**, Lead Teacher for Innovation, Liverpool Life Sciences UTC, and **Lyndsay MacAulay**, Director, Northern Schools Trust

In a busy school science lab it can be easy to miss hidden talent amongst the hustle and bustle of demanding students, keeping teams on task, making sure everyone is using the equipment safely and hoping that they will find the results they are expecting.

But spotting that student whose passion for science is not immediately obvious could be the key to one day finding the cure to cancer or a source of safe renewable energies.

Liverpool Life Sciences UTC is a pretty unusual science school. A longer school day, extensive industry curriculum support and a commitment from our students to future careers in science and healthcare means we are better placed than most to identify those who will go on to be the leaders of research in the future.



Here are our tips for applying some science to the search for hidden talent:

1 Use your data

So many of us now use the *Cognitive Abilities Test (CAT4)* for target setting, but are we taking full advantage of the different areas of information it provides? One often underused component that demonstrates a unique aspect of intelligence is spatial ability. This has established links with potential in science, technology, engineering and maths (STEM) subjects. Reflecting on a student's spatial scores – particularly where these are around 10 points higher than similar verbal, quantitative and non-verbal scores – can help you to identify talent in science.

2 Spot the patterns

Data from our students has allowed us to spot patterns. For example, those with spatial scores at least as high as or higher than their quantitative scores demonstrated particularly strong practical experimental skills. Knowing this pattern gives us some idea of who we should be keeping an eye on in future.

3 Alter your environmental variables

Allow students the opportunity to complete extended lab-based projects rather than just the short practical tasks typical of much of the curriculum. Doing this has helped us to identify those with the skills essential to a future in research. Students who were identified initially in the data demonstrated great skill in completing complicated lab procedures with a high degree of accuracy and precision.

4 Think beyond the exams

Strong performance in written tests and exams does not always correlate with excellence in the technical and experimental areas of scientific research. Through placing the emphasis on grades and attainment, we may be missing some of the most gifted experimental scientists.

5 Investigate further

Our school is still very young and it is too early to definitively say whether *CAT4* spatial ability is a consistently good indicator of experimental science ability. But, like all scientists, we are committed to investigating further.

This article was published in the TES.

FINDING THE ADVANTAGE



Here, **John Dyer** and **Lyndsay MacAulay** explain the techniques they have used to support a learner with a high spatial and low verbal profile



Hearing two teachers chatting over lunch, I was interested in the struggles of a young man in our Year 10 cohort at Liverpool Life Sciences UTC, one of the schools in our Trust.

I know the student, Mo, from the work he does with me in our innovation labs. I find that sometimes I have to send him back to lessons as he is so engrossed in the projects we deliver that he would stay all day. He often gives up breaks and lunchtimes and will practise the techniques we're using until he is easily outperforming the average life sciences graduate.

To me, Mo is keen, thorough, engaged, committed. To our curriculum science team, Mo struggles. He is seemingly bright enough to perform well at Key Stage 4 (set 2), but his low verbal ability holds him back, particularly in long written answer questions. We struggle to show his skills in an exam context but know he will one day be an excellent scientist.

So how did we find Mo's advantage?

We started to explore Mo's cognitive profile using CAT4. Mo, it turns out, has an extreme spatial bias on the basis of spatial vs verbal. He has above average quantitative and spatial scores and below average verbal scores.

Knowing this, I started to consider techniques we could use from our experiences with Mo in project-based learning science sessions to support his core classroom science learning. It all sounds obvious, but sharing the success of our practical lessons will be the difference in Mo achieving the grades he needs in science to continue.

Our techniques included:

1. Learning through practical work and demonstration.

Mo was able to watch a visiting academic demonstrate a procedure and then perfect it himself. We investigated forward and reverse genetics using the model organism, *C.elegans* (a nematode worm). Mo was the only student who managed to transfer a live nematode worm to a new plate without killing it during the first session. Other students achieved this later but Mo stayed behind and practised the technique with the academic. University students often don't get this far. This has improved his genetics knowledge for GCSE biology. But more than that, his teachers now know to use more visual demonstration and hands-on work to help him learn independently.

2. Finding opportunities to articulate. Giving Mo the opportunity to practise articulating topics he is interested in, initially outlining a physical process, verbally describing his hypothesis, his actions and his results, has helped him to improve. Verbally planning and taking feedback in his laboratory comfort zone has paved the way for him to do this in areas he was less willing and able. Now, during lessons we use this to help him to prepare for written six mark science questions. We've encouraged him to go as far as preparing and delivering verbal presentations to the class of the key written points, building his verbal confidence and his written scores.

3. Tapping into his enthusiasm. Mo has loved this project and dedicated five more hours of independent work to it than any other student. The assessment for this project has been a scientific conference-style poster presentation. Mo naturally shied away from the public presentation. But, the poster conference required Mo to articulate his findings and answer questions from both non-experts and experts – and he excelled in this session. It made my day. Mo was able to fully articulate the project and the theory behind his practical work. He was as good as any other student in the room, despite his low verbal CAT4 scores. More importantly, his confidence and enthusiasm about the topic encouraged and supported him to push through his low verbal confidence and want to tell the world about his work. This enthusiasm has helped in other subjects, too. In English lessons, he is now given a scientific topic to write about when writing for specific purposes and audiences, boosting his confidence.

4. Sharing Mo's profile with him. Metacognition approaches can help students to think about their own learning more explicitly, and the Education Endowment Foundation has found that the potential impact of these approaches is very high. We shared Mo's profile with him as a way of helping him understand how he learns best as well as the skills he needs to develop. He has certainly appreciated the opportunity to work on his presentation skills and enjoys being able to engage more with the practical side of things to support his understanding.

Finding the advantage from within Mo's CAT4 profile has allowed us to translate the successes of his practical subjects into his core lessons. It has not only built his confidence, but that of his teachers as they now know how to support and challenge him to succeed. We can't wait to read about his scientific discoveries in the future.

USING ASSESSMENT TO FIND HIDDEN TALENTS

Daniel Sims, GL Assessment's Business Development Director, explains how the company's whole-pupil approach to assessment provides teachers and senior leaders with the data and insights to gain a holistic view of each pupil.



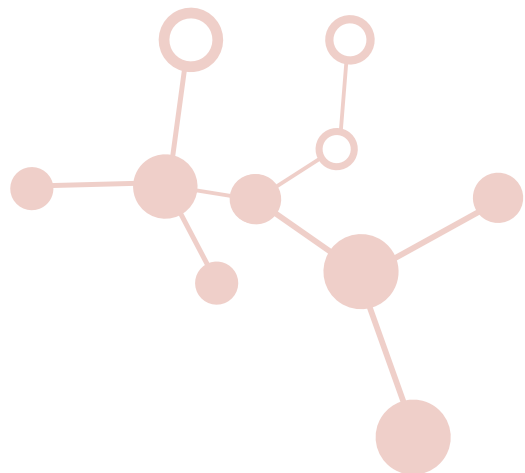
GL Assessment has worked in partnership with schools for over 35 years to develop a range of assessments that support better outcomes for pupils. Our assessments help provide teachers with a comprehensive understanding of a pupil's ability, attainment and attitude, and our data-rich reports help teachers spot patterns (at individual, group, school or cluster level), identify pupils who could be achieving more, and drill down into anomalies. They help alert schools and teachers to a child who may need special support and allow early intervention strategies to be put in place.

Our *Cognitive Abilities Test: Fourth Edition® (CAT4)* provides a robust, standardised measure of cognitive reasoning ability, without reference to curriculum-based material. Used by over 50% of UK secondary schools and an increasing number of primary schools, *CAT* measures verbal, non-verbal, quantitative and spatial ability. The resulting data is then used to identify a pupil's strengths, weaknesses and learning preferences, providing accurate and reliable information for teaching and learning. The results also include statistically reliable indicators for a student's future results at the end of KS2, GCSE or A level, helping teachers to set achievable but challenging targets and quickly identify if progress has halted.

CAT4 Combination Reports can also automatically combine and compare data from our other assessments – the *Progress Test in Maths® (PTM)*, *Progress Test in English® (PTE)* and the *New Group Reading Test® (NGRT)*. Presented in tables, bar charts and scatter graphs that allow for easy comparison, this report is the only type of its kind in the UK, helping schools identify if there are any discrepancies between ability and attainment that might require further investigation.

As this Hidden Talents report has demonstrated, there is a significant minority of children whose poor verbal skills mask their potential. The education system is still not well attuned enough to identify our spatial learners. And only deeper insight into a pupil's capability, learning problems, current and comparative performance and rate of progress will allow teachers to improve key information to parents and carers, and to personalise learning according to their specific needs.

For further information please visit gl-assessment.co.uk. To contact your local area consultant to organise a school visit or a free quote please visit gl-assessment.co.uk/consultants or to discuss your specific requirements, call 0330 123 5375.



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