See the world through my eyes: Looking into how we can improve provision for gifted visual-spatial learners in our classrooms.
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Abstract

This article describes a collective case study of three learners who have exceptional visual-spatial abilities relative to their age peers. These abilities create potential to achieve success in areas where the capability to visualise three dimensional images contributes to a creative problem-solving mindset. Literature reviewed to background the investigation topic suggested that characteristic differences in the way these learners process information can create barriers to successful classroom learning. Consequent areas of challenge within traditional academic domains, combined with their exceptional ability being rarely recognised or valued in schools, contribute to gifted visual-spatial learners being an “invisible group” (Gohm, Humphreys & Yao, 1998; Lubinski & Kell, 2013; Mahoney & Seeley, 1982; Seeley, 1987, 2003; Silverman, 1998; von Karolyi, 2013). These findings led to the development of a primary research aim to describe these differences and explore how they affect the learning experiences of these students.

Introduction

A review of literature undertaken for a Masters of Education thesis investigation prompted the writer to question the impact that having exceptional visual-spatial abilities has on how these students learn. Ascertaining the understanding teachers and other significant people in the students’ lives have of this exceptionality was a further aim. Raising awareness of the need these learners have for appropriate educational experiences that will encourage optimal development of these abilities was highlighted as being an important research outcome.

Gifted and talented learners are defined within the New Zealand education system as students who have exceptional abilities relative to their age peers. They have learning characteristics that give them the potential to achieve outstanding performance in one or more areas (Ministry of Education, 2012. The characteristic behaviours demonstrated by gifted and talented learners must be recognised and understood both because they can contribute to identification and because they create specific academic, social, emotional and motivational needs that can impact on their ability to achieve success in our education system (McDonough & Rutherford, 2011; Ministry of Education, 2012).

Visual-spatial learners can visualise three dimensional mental representations (think in 3-D images) and view those images from different perspectives in space. They use these abilities as they draw on holistic rather than sequential information processing strategies to solve problems (Kalbfleisch & Gillmarten, 2013). As a ‘hidden’ group, gifted visual-spatial learners are difficult to identify when traditional methods such as standardised testing and teacher judgement are relied on too heavily (Education Review Office, 2008; Gohm et al., 1998; Humphreys & Lubinsky, 1996; Humphreys, Lubinsky & Yao, 1993; Ministry of Education, 2012). The lack of understanding that exists around the effects of possessing exceptional visual-spatial ability means that the needs that these create are often not met and that potential positive implications also fail to be capitalised upon (Education Review Office, 2008; Wai, Lubinski & Benbow, 2009; Webb, Lubinski & Benbow, 2007; von Karolyi, 2013).
Method

This research used an exploratory case study approach to explore the lived realities of three students with a focus on their learning experiences. The study sought to present descriptions of students who could provide added insight into the different ways that students who fit a gifted visual-spatial profile perceive, store and use information, together with an examination of how different learning contexts work for and against them. The study of multiple cases selected to illustrate different perspectives of the same issue is termed a ‘collective case study’ (Stake, 2005, 2006). This study examined cases of three students in the mid-primary to intermediate school area, aged from 9-12 years, each from different educational settings. The decision to examine three cases acknowledged the reality that within any grouping, members will display diverse characteristics such that while common features will determine group membership, individuals will also differ from each other in various ways. By comparing three cases, it was anticipated that both commonalities and differences would be identified and overly prescriptive description to some extent avoided.

An in-depth picture was created through collection of data from multiple sources of information (Creswell, 2007). Data gathering tools included individual interviews with the students, their parents and their teachers. An interview was carried out with the education sector specialist consultants who had conducted interviews and completed standardised testing in order to accurately indicate areas of ability. Information from their report was also incorporated as data, together with student work samples, standardised testing results and reports from schools, and observations of the students in different learning settings.

A photo elicitation technique was used within the student interviews. The process followed was based on recent work on a similar “How do we learn?” theme carried out by Phelps, Nhun, Graham and Greeves (article in press) with students in Vietnam. As in their study, an initial conceptual discussion inquiring into what learning is and how it occurs took place. Then students were given a camera and asked to photograph, over the course of several days, examples that showed how they learn, both in and outside of school. A follow-up interview was then conducted, where the photographs acted as a concrete visual that linked to personally meaningful experiences as a prompt for communication (Phelps et al., (article in press).

The decision to include this technique was based on its good fit with the characteristics of the participants. The photographs were intended to provide a scaffold for lower verbal ability that was anticipated as a possible feature. It was also hoped the children would feel empowered through participating and making choices over what to photograph (Einarsdottir, 2007; Epstein, Stevens, McKeever and Baruchel, 2006.

Data analysis

Following transcription of each interview, a coding procedure was carried out whereby similar data was drawn together within relevant categories. The first step involved ‘data reduction’. In order to begin the transformation of contextually laden and subjective information (Woods, n.d.) contained in each transcript into more objective findings that could be compared across all three cases, a written account was created that captured the major points uncovered within each
interview. These were then analysed, with key ideas coded as relevant themes that addressed each research aim. Other data sources were analysed to provide more objective data to balance what may be viewed as perceptual self-reports gained through interviews and observations.

Participants

**Case A** was given the pseudonym Kyle. Aged 11 ½, Kyle is the youngest of three boys and has been exclusively home-schooled by his mother who is a trained primary teacher. He was working at a Year 7 level at the time of data collection and also attending a one day a week gifted withdrawal programme.

Meeting criteria for enrolment in the gifted programme involved a comprehensive assessment process that included the administration of a standardised assessment tool, the Woodcock Johnson III Tests of Cognitive Abilities Version 3.1 NU (WJIII). This test placed Kyle above the 99th percentile for General Intellectual Ability. His lowest score was for phonemic awareness at the 72nd percentile (average range for age) and this relative weakness, together with his displaying many of the characteristics of a gifted visual-spatial learner, saw him classified as such by the testing assessor.

**Case B** is a 9 year old girl, named Danielle. She is the youngest of four and was born in Brazil, moving to New Zealand at age 4. Danielle is bilingual; her family speak both Portuguese and English. She was in a Year 5 class at the time of data collection and also attending a one day a week gifted withdrawal programme as well as involvement in a GATE (Gifted and Talented Education) programme at her regular school that withdraws students for enrichment activities.

This student scored above the 98th percentile for General Intellectual Ability on the WJIII. Her lowest score was 86th percentile for Verbal Ability. The assessor identified her as a gifted visual spatial learner based on scores at the 99th percentile for both the Concept Formation/reasoning and Spatial Relations subtests, together with her preferred activities.

**Case C** is a 9 year old boy given the name William. William has an older sister and a younger brother and at the time of data collection was working in a Year 5 class.

The WISC-IV assessment for William showed statistically significant differences in his abilities with scores ranging from a 99th percentile rank for perceptual reasoning to a 9th percentile rank for working memory. In analysing his results, the educational psychologist identified him as being visually spatially gifted. She recognised that the combination of significantly less well developed verbal abilities and listening abilities relative to his outstanding visual-spatial abilities would lead to difficulties with classroom learning. She noted that understanding questions and instructions and giving explanations and expanding on his original answers were difficult for William, while also pointing out that he was an intelligent observer who relies very much on what he sees. Following her recommendation, William was assessed and diagnosed with an auditory processing disorder in April 2012 and had used a personal remote microphone hearing aid system in class for the past year.
Findings and discussion

**Visual-spatial processing: A different way of organising information**

The strengths that characterise gifted visual-spatial learners were apparent in each case as the students talked about their learning. Evidence demonstrating how the act of visualising forms a fundamental component in the way they process information was noted. Each student showed that learning for them involves the creation of a permanent three dimensional image. The exceptional capacity they have to utilise this ability was visible as they described using visualisation in contexts such as planning how to carry out a task.

The three dimensional form that this visualisation takes was described by Danielle’s father when he explained the strategising he observed her trying to follow to work out subtraction facts. He acknowledged his own thinking as he solved 12 – 8 as “since I was a little kid, I take 2 that is over 10 and 2 that is below 10 ... I put 2 here and 2 here” and noted that Danielle needs to make a visual representation of what is happening to the numbers saying “she’s very spatial, you know, she’s very ... she has to see things and look at things”.

Sometimes, this creative process involved the students using their excellent observational skills to learn by watching and formulating an internal model of how something works. Kyle provided a photograph and talked about his experience of taking a television set apart, describing it as “an interesting adventure”. He was fascinated by the way the components of this dynamic system interact.

At other times, the students imaged complex and abstract ideas as they created novel products. When Danielle wanted to explain to me how she had figured out how a brand of cereal was made, she drew her idea. She was explicit in describing what each part was and as she drew and explained she used present tense verbs and described as if it was something she could actually see happening.

The learners all demonstrated an introverted, reflective approach to learning that supports the way they gather in and process information in a holistic fashion. In each case the problems discussed below can be related to the different way that the learner incorporates information they perceive through observation and other experience-based actions into a globally-connected, visually-oriented web of knowledge (Sword, 2000).

**Aspects that are challenging for visual-spatial learners**

The natural gift these students have for creating images that represent ideas sets them apart from most other students not only through the superior level of their ability to do so; the three dimensional form that these representations take also gives rise to significant differences that can impact on classroom learning. While tasks that utilise their spatial abilities can be performed to a high level, these same abilities do not lend themselves so well to the performance of tasks that involve sequential or step by step processing (Gohm et al., 1998; Mahoney & Seeley, 1982; Seeley, 1987, 2003; Silverman, 1995, 1998, 2002). This asynchrony was observed in the first case whereby Kyle found the act of writing irksome as it interrupted his flow of thought processing. Danielle experienced difficulty with rote memorisation and understanding of basic math facts when this learning was not presented in a way that made sense to her. William’s case was an example of where the disparity was so large as to be symptomatic of a learning disability. Difficulties with verbal communication were noted together with organisational challenges.
Kyle described writing as a tedious and pointless task. Silverman points out how difficult and time consuming it can be for those who think in pictures to have to find the right words to describe their image (Silverman, 2002). Kyle’s experience demonstrated how stopping to write interrupts the flow of his thought processing – forcing what is naturally a rapid, fluid process to break down as it continuously grinds to a halt in order to mechanically record the facts so far in words. Enforcing the need to stop and record in writing hampers his ability to make connections and to expand the detail within his picture thereby creating feelings of frustration.

The concept of asynchrony was visible too in Danielle’s comparative difficulty with math computation. While she was having difficulty with basic computation and number knowledge, her teacher acknowledged that in areas such as patterns and strand-based knowledge, she was doing much better. Excelling at math concepts with an accompanying difficulty verbalising the steps and slow processing of computation is a commonly observed characteristic of gifted visual-spatial learners (Golon, 2004, 2008; Mann, 2001, 2005; Rapp, 2009; Silverman, 2002).

I very quickly experienced that William struggled to respond to my verbal questions. His parents had explained that he had delayed speech, not beginning to speak until he was nearly 5 years old. As an interview subject, his lower capability with language expression impacted on his capacity to interact with me and to explain his ideas and experiences.

The understanding that the organising schema of visual-spatial students does not utilise the same parameters of time and space as their school-savvy auditory sequential classmates is central to a useful insight into how they perceive the world. The visual-spatial student’s spatial organisation of information whereby all knowledge is interconnected is what sees them described by some as a holistic learner, who sees ideas conceptually. This ‘all at once’ overview can be viewed to contrast with an auditory sequential student’s manner of aligning pieces of information sequentially, in an expected order (Silverman, 2002; Sword, 2000; Porter, 2009). Indications of this alternative processing style that were noted as being problematic for William included a difficulty with being methodical, not having a strongly established left to right progression, and responding using the present tense regardless of the tense of the question.

The level of understanding that others have of the spatial component of the term ‘visual-spatial’ was found to vary. Some, and this was particularly noted of family members who acknowledged sharing this way of processing information, appeared to possess an implicit understanding. Others seemed to attach meaning to the visual part more readily as they too utilise this sense, but struggled with adequately assigning significance to the spatial part of this concept, and this lack also adds to the communication barrier.

The two students who had a better balance of strengths were each receiving differentiated provision that acknowledged their giftedness. The third student, who fits a twice exceptional profile with a diagnosed auditory processing disorder, was receiving assistance that focused on remediation of his learning difficulties only. Knowledge about visual-spatial ability was not evident in either of the two mainstream school settings; however the gifted education specialist programme teachers did have this expertise and responded appropriately to needs that this different information processing style generated.

Kyle talked about his own perception that his learning style was different to the peer that he often chooses to work with at his gifted education programme. He commented that he would just remember key points that he ‘looked into’ while researching whereas his friend would write down what he found. This understanding illustrates one of the primary conceptual differences
between Silverman’s gifted visual-spatial learners and those she terms auditory-sequential learners. Gifted learners who have gained their knowledge in the prescribed and expected way are most readily recognised as being gifted as they easily achieve academic success. Horn (1976) described the knowledge that visual-spatial learners bring to tasks as often being ‘incidental’ to that taught in schools. Rather than being primarily amassed through an approved system of passing on facts and predetermined knowledge, these learners use their own keen sensory capacities and observational skills, adapting their responses and behaviours as they build up a global web of knowledge (Silverman, 1995, 1998, 2002; Sword, 2000).

What has helped?

As with all forms of giftedness, differentiation for gifted visual-spatial learners must provide content, processes, products and learning environments that are appropriate for their different way of processing information (Bell, 2010; Ministry of Education, 2012). While variations demonstrated across the three cases make it impossible to present one ‘recipe’ for designing appropriate provision, common threads that ran through each case are highlighted in the following section.

Utilising visual-spatial strengths to maintain motivation

Provision of a student-centred learning environment can help to address social and emotional issues including maintaining motivation. Allowing learners to utilise their strengths is important in order that they experience success. Too much focus on remediation of weaknesses on the other hand can reinforce negative messages about their abilities (Sword, 2002).

In discussing what it is like for students who struggle with some aspects of school but have other areas where they have a very natural, intuitive ability, William’s parents agreed on the importance of using topics of high interest to the visual-spatial student and allowing them scope to work from their strengths rather than focusing too much on remediating perceived weaknesses, for maintaining motivation. William’s mother talked about him coming home from school so mentally tired after a day of working at school in ways that do not work in sympathy with his natural style of processing, that it was a struggle for him to find the resources necessary to complete piano practice or homework or anything that required him to dip into his reserves.

Kyle’s gifted programme teacher agreed that one of the important benefits for gifted children of attending a programme such as theirs comes from the student being given the flexibility to work to their strengths and thereby create and present work that showcases their abilities and through this, experience success. Sword (2002) wrote of the relief she observed when children finally understood that rather than there being something wrong with them, the problem was due to them thinking and learning in a different style to the way our school system teaches. In describing the damage that occurs when educators focus too much on remediation and trying to fix problems, she noted the consequence that these creative children do not learn how to use the visual thinking that they are really good at and in fact, can come to regard themselves as dumb.

Student-directed learning

Having never been educated in a regular classroom setting was a real point of difference with Kyle. His home schooling has provided him with an individually designed education that allows him to utilise his strengths and work around his weaker areas, keeping him motivated and positive about learning. Kyle’s case demonstrated how this pedagogical style meshes with his
way of thinking and learning. There were many examples of him engaging in self-directed learning that demonstrated the holistic processing that is a core feature of a visual-spatial learning approach. His curiosity to find out how things work and to then design and create solutions to real world problems often incorporates empathetic and ethical dimensions. When learning experiences involve solving a problem about which the learner cares, they will own the learning and retain it for transfer to future applications (Silverman, 2002).

Student-directed learning provides an ideal vehicle for meeting the needs of gifted students overall (Ministry of Education, 2012; Riley, 2004). When students are engaged and motivated, responsive teaching can take place that mediates individual students’ learning needs as they arise. For example, teachers can help with focus, assist with planning, provide feedback that prompts further meaningful learning, make the processes they are employing explicit and help them to use metacognitive skills to self-monitor their progress (Alton-Lee, 2003). The higher order thinking that these learning conversations promote provides the ideal foundation for fostering the mastery orientation that motivated learners exhibit (Dweck, 1999).

**Experiential contexts that support deep learning**

All three students showed a preference for seeing an example in action and then figuring out exactly how it worked. Physical modelling of processes that allows for visualisation of an overview of what it looks like as the process unfolds was seen as helpful; particularly where these require step-by-step progression. This preferred learning method involved following the image that they created themselves as they recognised the ‘complete idea’. Having a practical event to recall also provided a starting point in their image-based thinking when they were required to verbalise. This finding also validated the decision to use photo elicitation as a technique within the data gathering process.

**Time to process and conceptualise**

The case study students all showed that taking an extended time to process and conceptualise information was a significant element of their learning process. Therefore, an appropriately differentiated curriculum for these three gifted visual-spatial learners should incorporate planned opportunities that support their development of a visual image.

For example, Danielle got off to a slow start comprehending my verbal explanation of the planned process for our interviews, however after time for reflection she had found her way and by our second session together she demonstrated that she was linking the taking of photographs with the recorded information on the mind map we had created together and had formulated a very cohesive understanding. Key for Danielle was that she struggled to understand the solely verbal information and needed time and support to make links between what she heard and other supplementary information such as visual cues and her image-based prior experience.

Kyle’s parents described how his creative process involved an extended time of working mentally with a new idea before he was ready to present his thinking in a concrete way. Williams’ parents also described how he needed this extended time to observe and mentally rehearse before he would attempt something new; however he often proved very capable when he finally did so.

**Communicating graphically, or using tangible objects**

While maths was an area of interest and ability for Kyle and William, Danielle’s classroom teacher acknowledged she “stumbles in her thinking” with understanding and using different math strategies. Her father understood the difficulty she met in trying to learn basic math facts and
strategies as a kind of ‘block’, saying she needs to have things explained to her in a certain way that works for her.

The translation time required for a ‘picture thinker’ to transfer, create and absorb is addressed by Mann (2001, 2005) who suggests frequent pauses in lectures/instructions and encourages the drawing of diagrams, the use of graphic organisers and note taking in pictorial form to aid recall. Also important is being explicit about meanings of maths vocabulary thereby avoiding implicit assumptions about shared understanding of the terms that are used in verbal explanations (Alton-Lee, 2003; Christensen, 2004; Khisty & Chval, 2002; Sullivan, Mousley & Zevenbergen, 2003; Walkerdine, 1988).

Alton-Lee (2003) also advocates that teachers provide multiple opportunities for students to create non-linguistic representations of their understandings. Danielle demonstrated more than once that she liked to draw her understanding, or show the object she was talking about, and that it helps her to verbalise her thinking to be able to do so. For Danielle and others like her, providing opportunities for them to draw a picture or build a model to represent their thoughts can really help them to be able to present and share their ideas and thereby enable truly effective teaching and learning to take place (Hatano & Inagaki, 1998).

Using visual-spatial strengths for literacy acquisition
Maxwell (2003) discussed the importance of cultivating visualisation and imagination to aid the visual-spatial learner’s acquisition of reading. She recognised their love for fantasy books and their fascination with unusual story lines that include unexpected, quirky happenings. She also noted that visual-spatial learners can better utilise their strengths of visual memory and pattern recognition in ‘whole word’ reading instruction.

Golon (2008) supports this viewpoint, suggesting ways to incorporate visuals, music, colour, humour – all features that allow visual-spatial learners to demonstrate their understandings through utilising their strengths - into a language exercise. Presenting ideas in more graphic form, e.g. a storyboard or a cartoon, at least initially, enables visual-spatial students to experience more positive feedback on their abilities.

William’s teacher also suggested that looking for familiar chunks or other details that provide visual cues to help with working out unknown words was something that would help him. As phonological awareness is a recognised weakness for students like William, this is an area where it is important that the approach used accounts for his different way of learning. Literature on the way that a visual-spatial learner learns supports that an approach that works backwards from the whole, analysing its parts, might work better for a visual-spatial learner than one that sequentially builds up step by step towards a whole. As well as utilising the visual-spatial learner’s strength in their ability to visualise a whole word rather than their weakness in listening for sounds, they are enabled to employ a further strength in finding visual patterns and they are applying these strategies within the context of a word that has meaning attached (Golon, 2004, 2008; Maxwell, 2003; Silverman, 2002).

Direct instruction in organisational strategies that utilise visual strengths
William’s mother described her process in helping him with a language skills homework task. She spoke of showing him a step by step process through one on one demonstration, physically modelled for him to see at a pace he could control. The process itself would be likely to break down and become incomprehensible to him if it was being verbally explained without that
physical one on one interaction happening. For a student like William, actually seeing someone doing what he needs to then follow is the critical aspect that allows him to make a visual mental image that he can then commit to long term memory and call on as he follows the process himself. It also allows him the opportunity to find and then follow patterns that help him to make sense of this and future tasks (Maxwell, 2003).

Silverman (2002) writes that those for whom such organisation comes naturally will often not understand the problem because they assume everyone else should be able to do it as easily as they can. As illustrated in the example of William above, she also points out that visual-spatial learners need direct instruction.

A learning environment that is sympathetic to overexcitabilities
The idea that gifted students can have difficulty coping with over-stimulation from an excess of sensory information in a busy classroom was explored in the literature review carried out for this study. The downside of being exceptionally sensitive includes limitations imposed by the student responding to protect themselves from too much input by way of noise, light, smells, as well as physical and emotional sensations (Lind, 2001). Bell (2010) noted the importance of meeting social and emotional needs and awareness of potential difficulties that can result from oversensitivity to sensory stimulation is a dimension of provision that should be acknowledged when considering the needs of gifted visual-spatial learners.

William’s Auditory Processing Disorder diagnosis along with comments made by his mother suggests he does find this problematic. By way of contrast, Kyle’s gifted programme teacher made comparisons between him and the other gifted learners in her class in terms of the learning environments that they each experience. She observed that Kyle has been advantaged through having material presented in his home school programme that is individualised for his learning level and noted that he listened better than a lot of the other students who she noted had spent years ‘bombarded’ by an overload of extraneous sensory information in busy mainstream classrooms.

Working with like-minded peers
Provision of intellectual peers is a valuable feature of Kyle and Danielle’s gifted programme. These learners benefit from opportunities to have others introduce new ideas, or ways of looking. This is relevant to all gifted learners in that it underlines the need they have for working with others of similar ability, rather than always being the one who has the most knowledge (Cathcart, 2005). Also, they are given the opportunity to work with others who share their capacity for learning quickly and easily. This aspect is important for gifted students in that it helps to normalise their educational experiences somewhat, supporting the development of their self image in a positive way. Social and emotional needs of gifted visual-spatial learners can be further addressed through opportunities to work alongside others who share their different style of learning. They particularly benefit as their divergent thinking and working style often sees them out of step with others (Silverman, 2002).

Examples of the case study students employing a community of learners approach in their self-directed learning were observed (Gabelnick, MacGregor, Matthews and Smith, 1990). A notable part of her creative process involved Danielle in consulting with others to canvas their opinions. Comments made by Danielle’s gifted programme teacher demonstrated some of the ways in which the learning environment can be differentiated so that students are able to use areas of exceptional ability within challenging tasks such that positive feedback on it is received.
Conclusions

The students all showed they work better in hands-on experiential learning situations and that they reflect deeply on sensory input perceived through observation and physical interaction. This information is then integrated into a global, visually-oriented, interrelated network of knowledge. All three students showed they were adept at imaging complex and abstract ideas and that learning for them involves the development of a permanent three dimensional image. Visualising and making connections between image-based representations is an integral part of their learning process.

The three cases demonstrated that the implications of having exceptional visual-spatial ability exist on a continuum, depending on how well balanced these are with strengths in other areas. All of the case study students demonstrated learning difficulties that, while differing in type and degree, can be explained as being a consequence of their exceptional visual-spatial ability.

These gifted visual-spatial learners all excelled when provided with opportunities to engage in self-directed learning experiences that tapped into their intrinsic curiosity about the world around them and facilitated their ability to see relationships and detect inconsistencies as they sought to explain what they observed. An appropriate education for these individuals will acknowledge the significance of their creativity and problem-solving as attributes that are highly valued in today’s globally competitive world of innovative technology. They should be encouraged to exercise their ability to create solutions to problems that are dependent on the visualisation and understanding of complex three dimensional systems and the recognition of visual patterns (Lubinski & Kell, 2013).

Recommendations

Professional development of educators around the concept of giftedness in general is needed for the provision described above to be implemented effectively. Specialised knowledge is necessary in order to build a platform from which to design provision that meets the individual needs of each gifted learner. For gifted visual-spatial learners, this must include recognition, valuing and development of exceptional abilities that are not based on verbal/sequential reasoning.

A shift in attitude away from the belief that all children learn the same way needs to be fostered. Provision of differentiation that accounts for the differences described earlier is necessary for gifted visual-spatial learners to thrive. To differentiate for gifted visual-spatial learners requires an in-depth understanding of both the characteristics and behaviours that are found within the concept of giftedness generally and of the different way that visual-spatial learners perceive, organise and interact with information. These students need teaching methods that acknowledge and use their strengths. They need provision with a focus on preserving and building up these abilities to enable them to develop their talents and achieve their potential.

Implications for practice and future research
The small sample size explored limits the extent to which the conclusions reached can be generalised to the total population of gifted visual-spatial learners. The lack of New Zealand-based research that has been conducted on this population indicates an opportunity exists for further studies that could extend the scope of this research, for example, towards incorporating specific cultural differences. While limited in scope, the data generated that describe the knowledge that teachers, parents and significant other adults in the participants’ lives have of the aspects of their learning that set them apart suggests a significant need exists for further research to inform National Education Guidelines, Ministry of Education policies, to provide grounding for both special educator and teacher education programmes and for on-going professional learning.
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