**Understanding how gifted and talented students learn**

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## What do we do when we learn ?

We are interested in how gifted children learn. There are a range of questions we need to examine

- how does the knowledge of gifted students differ from that of students who are not gifted ?
- how do gifted students differ in how they think ? Evidence that they think faster, in greater depth, in larger steps at once ? Are they able to change that they know more easily ?
- do gifted students manage their learning and thinking more efficiently ?
- do gifted students have greater confidence in their ability to learn and think ?

To answer these questions we need to develop a framework for understanding knowledge and how it changes. Following is a description of a 'bof'. Work through it and use it to decide what a bof is and what you did to make this decision.

> *Peter knew enough about bofs to be aware of the danger he was in. He thought about his predicament . Bofs, he knew, were short-sighted, but had a very good sense of smell. They also had very sensitive hearing.*
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> *In the distance he could hear the roar of the river. Would that cover the noises that he was sure to make as he tried to escape ? Slowly and silently he turned and backed away from the clearing.*
>
> *The bof couldn't see Peter, but knew that he was escaping; its sense of smell told it this. It padded along on its huge paws, claws sharp and extended. It moved its head from side to side, its nose pointing up and swinging like a radar scanner searching for its target.*
>
> *Peter made his way to the waterfall. He stopped on the bank of the river, keeping as still as he could.. Then he saw the bof again. It was standing on a rise that ran along the bank. It was hungry. It was also angry because it had been deprived of its dinner. It padded up and down on the green grass carpet making a soft grunting noise as it moved, It furiously sucked in air through its dilated nostrils as it searched for Peter's scent. Its huge arms thrashed around as it groped for its quarry. Suddenly its pointed ears pointed in Peter's direction.*

What, do you think, is a bof ? _____

What did you do to reach this decision ? How did you form your impression ?

| To learn a new idea most students | Gifted students |
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| **need a challenge or reason for learning** : they<br>• differ in their motivation to learn: whether they are self-motivated or motivated by others. Motivation to learn ranges from extrinsic to intrinsic.<br>• differ in their motives for learning; their purpose can be to<br>  • reproduce or memorise information (superficial or shallow motives)<br>  • 'take ideas apart' (deep motives).<br>  • learn ideas to satisfy external criteria, get good marks (achieving motive). | • learn well by having their knowledge challenged, by being able to frame up questions that they pursue.<br>• are more likely to show intrinsic motivation to learn. They resist extrinsic motivational orientations.<br>• are more likely to show deep motives for learning, to want to 'take ideas apart', question and extend them by linking with what they know. They often resist learning for superficial or achieving motives. |
| **need to know where they will end up**, be assisted to 'see' the goals | • learn well by forming an impression of where they will end up, see their goals |

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| **make links with and use what they know re topic**<br>• they link the information with what they know about a topic in different ways : by<br>  • talking to themselves about the ideas, build ideas in linguistic ways.<br>  • thinking scientifically about the information.<br>  • forming images or mental pictures about the information<br>  • thinking of the key actions and use this to learn.<br>• differ in how fast and efficiently they handle information<br>• what they know about how to learn, how to think, their thinking or learning strategies<br>• use what they feel about themselves as learners of the ideas (self efficacy)<br>• identify what they don't know about the topic<br>• recode what they know to match the teaching | • can have superior existing knowledge of a topic that is better differentiated and elaborated in a range of forms:<br>  • verbal, abstract, 'semantic' form (verbally gifted)<br>  • imagery, experiential form (visual spatial gifted).<br>  • procedural form<br>  • scientific-mathematical form (math/ scientifically gifted)<br>  • musical form<br>• learn in idiosyncratic ways. They are often not easily programmed externally and need to align what they know with the teaching.<br>• process information faster and efficiently, show cognitive efficiency (e.g., memory span) (Saccuzzo, Johnson & Guertin, 1994), show higher efficiency in elementary processes (Geary & Brown, 1991) that determine more complex processes.<br>• need to see that they will be allowed to manage and direct aspects of the learning, that they are valued for what they know and how well they can manage the learning.<br>• are curious, good at questioning a topic or the ideas they will learn about.<br>• need to have the opportunity to recode what they know to match the teaching<br>• often set unrealistically high standards and goals for themselves. |
| **need to see a pathway to the goal** | • prefer to set their own pathway that they can follow to the goal . |
| **learn new ideas in specific contexts** by<br>• using a range of learning strategies:<br>  • actions, imagery, familiar language;<br>  • recode imagery, action knowledge<br>  • answering questions<br>  • decide how a new idea is like what they know<br>  • change their minds, make and correct mistakes,<br>  • talk about the ideas in different ways ?<br>  • make a picture of the ideas, imagine them<br>• holding information they can in short term memory or the thinking space.<br>• using the information in different ways;<br>  • some segment it into parts, work on each part; analytic sequential thinking.<br>  • some make rapid guess about main idea and check or confirm their guess; global wholistic thinking.<br>• differ in how they manage and direct the learning (their 'metacognition').: some<br>  • manage their learning; plan, monitor their progress and review how they have learnt<br>  • look for direction from others to learn | • know how to use their knowledge better.<br>• learn in idiosyncratic ways. They are often not easily programmed externally and need to align what they know with the teaching.<br>• ask questions spontaneously *How can I get from ...to .. ?*<br>• explore possible options, trial ideas, interpret ideas as problems to solve<br>• use analogy, make comparisons well, think about ideas in different ways; for example, think intuitively, in imagery or action ways<br>• link and categorise ideas at a high level<br>• look for cause-effect or consequences<br>• often do not need much practise to learn new ideas<br>• often do not get the appropriate corrective feedback<br>• recall better from short term memory and use higher level organizational strategies such as category naming and clustering (Coyle, Read & Gaultney, 1998; Gaultney, Bjorklund & Goldstein, 1996). They showed higher level of stability in strategy use with high levels of recall. Short term memory ability matches their area of giftedness ; math gifted learners do better on number memory tasks while artistically gifted learners do better on visual tasks (Dark & Benbow, 1991, 1994).<br>• prefer to use global wholistic thinking more than analytic sequential thinking (Brown & Yakimowski, 1987).<br>• show superior metacognitive knowledge, more able to monitor comprehension |
| **deepen what they have learnt; abstract it, link it more broadly with what is known**<br>• link episodic, abstract and procedural aspects of idea<br>• review, consolidate what was learnt<br>• decontextualize, summarize, organize, link with what is known, main/subordinate ideas.<br>• elaborate and extend ideas through questioning<br>• look at ideas from different perspectives | • use more complex cognitive or thinking strategies than non-gifted students<br>• show better far transfer of strategies to situations quite different from those in which strategy was learnt, eg problem solving strategy,<br>• use strategies more spontaneously<br>• show superior problem-solving strategies, are more flexible in shifting from one strategy to another for complex problems and transfer understanding from one problem to related problems more effectively |

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| **invest positive emotion in the new knowledge**<br>• interest level,<br>• value<br>• use of ideas<br>• students as successful learners of ideas | invest positive emotion in the new knowledge if they managed and directed the learning |
| **store what they have learnt in memory,** practise remembering it | store easily what they have learnt in memory, practise remembering |
| **identify how they learnt,** what they did that helped them to learn | because many gifted students learn rapidly in idiosyncratic ways, rather than being programmed to think, it is useful for them to reflect on how they went about learning. |
| **see themselves making progress** | see themselves making progress |
| **automatise what they have learnt** so it can be more easily used | many gifted students automatise what they have learnt in meaning ways rather than through being taught rules.<br>they often do not automatise ideas by rote |
| **transfer and generalise the new knowledge** | show far transfer and generalise the new knowledge far beyond the context in which it was taught |
| **organise what they have learnt for assessment purposes** | organise what they have learnt for assessment purposes |

***Serial - analytic versus synthetic-global strategies*** Learners think about ideas in two main ways:

- analytic strategies that analyse ideas into parts step by step way and sequence them
- wholistic strategies that integrate ideas with other ideas, treat each ideas as a whole.

Many gifted students use one wholistic strategies at a high level.

| Serial - analytic strategies | Synthetic-global strategies |
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| • Work on bits of information step by step<br>• Learn step by step, delay giving answer.<br>• Focus on detail and specific facts.<br>• Think in direction provided.<br>• More likely to learn the conventional ways of thinking<br>• Take things apart, work on the parts<br>• Easily programmed by external information by analysing and taking on board small changes at a time<br>• Follow other people's directions well<br>• Think by linking the parts in conventional ways.<br>• Analyse, sequence ideas in taught ways<br>• Find it easy to learn the 'rules of play' of situations when these are explicit<br>• Prefer less flexible convergent learning<br>• Learn other's explanations, procedures<br>• Show what they know in conventional, acceptable, taught ways | • Look for overall patterns, scan<br>• Leap in and answer quickly, guess impulsively<br>• Focus on overall idea, miss or ignore detail<br>• Think by moving in several directions at once.<br>• Develop their own ways of thinking. May think very quickly and not reflect on how they thought.<br>• Think in wholes<br>• Not easily programmed by external information, attempt to align what they think with parts of information<br>• Prefer to direct, manage their thinking, flexible, not phased by unanswered questions.<br>• Think by imposing their personal links, drawing in ideas that may seem irrelevant, 'off the track', lateral.<br>• Arrange, sequence ideas less predictably.<br>• Don't take on the 'rules of play' when these are explicit, use their own rules of play<br>• Prefer flexible, open-ended learning contexts<br>• Prefer to work out own explanations, sometimes using other peoples' explanations.<br>• Show what they know in less conventional ways; have difficulty using conventional ways of display |

Task 3 Use the learning framework above to develop a procedure for assisting classroom teachers to identify gifted learning while they are teaching a unit of content to a group of students.

***Metacognition and giftedness***

- Metacognition describes how students become responsible learners regulating their own learning and performance.
- Self-regulation is the highest level of metacognitive activity (Borkowski, 1996) and includes
  - monitoring or self-checking,
  - planning or goal-setting, and
  - attending and rehearsing.
- Gifted learners use self-regulatory strategies such as defining, focusing, persisting, guiding, coping, correcting, reinforcing and solving.

The Good Strategy User Model is useful for examining metacognition in gifted students (Carr, Alexander & Schwanenflugel, 1996). Three components:

| component | gifted and average students |
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| knowing how to use a particular strategy | gifted elementary students<br>• use more complex strategies<br>• use strategies more spontaneously and independently<br>• don't differ from non-gifted students in near transfer of strategies to use in similar situations<br>• show far transfer of strategies to use in situations quite different (for example problem solving, elaboration) |
| knowing when, where and why different strategies should be used | Gifted children have better knowledge about why particular strategies work |
| knowing how to evaluate, check and change strategy use | Gifted children are no better than average children in<br>• judging the effectiveness of a strategy,<br>• adopting alternative ways of solving problems. |

Gifted students use the same strategies and rules during problem solving as average learners; they don't show qualitative strategic differences (e.g., Gaultney, Bjorklund, & Goldstein, 1996; Jackson & Butterfield, 1986). However, they use the more advanced rules, use strategies more efficiently and learn new strategies more easily (Geary & Brown, 1991). They show superior problem-solving strategies and flexibility in shifting from one strategy to another for the complex problems, and transfer understanding from one problem to related problems more effectively ( Kanevsky, 1992)

***To collect metacognitive data to decide if students are gifted*** Metacognition in a particular talent domain may become important after the early learning years, when children have learned the basics of their field and become immersed in strategy and self analysis.

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| Think aloud | students think aloud while doing a simple task (Ericsson & Simon, 1993). Record and analyze what they say, with other data such as writing, drawing, videos, behavioral observations that reveal the cognitive processes (Hong & O'Neil, 1992). |
| Portfolios : | Reports from 4 people over period on a student's ability in 4 areas (Shaklee, 1993):<br>• acquisition and retention of knowledge<br>• application and comprehension of knowledge<br>• creation of knowledge and<br>• perusal of knowledge<br>Metacognition is one indicator of the application and comprehension of knowledge. |
| Problem-solving tasks | Analyse and score contextual problem solving tasks for fluency and flexibility |
| Dynamic assessment procedures | In particular domains (Bolig & Day, 1993) to measure the rate of learning transfer and rate of learning, particularly for far transfer |

Task 4 Develop a procedure that classroom teachers can use to identify gifted learning by observing students' use of metacognition.

**Developmental trends in gifted learning.** As well as looking at how gifted students go about learning at any time, it is useful to look at how gifted students develop intellectually. This allows us to look at issues such as early identification.

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| Piaget proposed<br>• we make sense of the world by using what we know<br>• we symbolise the world in various ways; actions--> images -->real world concepts --- >abstract concepts<br>• thinking consists of mental operations; physical actions are internalised.<br>• our knowledge consists of sets of related ideas (schemes) .<br>• our ways of knowing change qualitatively through a sequence of stages<br>  • sensory-motor stage; action understanding.<br>  • pre-operational stage; perceptual understanding; 2 sub-stages<br>  (1) perceptual understanding and<br>  (2) intuitive understanding<br>  • concrete operation stage; real-world logical understanding.<br>  • formal operational stage; abstract understanding.<br>• our knowledge changes in situation of cognitive conflict; two adaptation processes;<br>  • link new ideas with what we know;<br>  • change what we know. | Gifted children differ qualitatively in how they develop thinking. The order of stages is consistent but organize their knowledge differently; they<br>• move through stages faster (Hix, 1990; Lempers, et al., 1987) of up to 2 years (Carter, 1985). Moderate and highly gifted students do not differ in speed (Bekey & Michael, 1987) and can do at least one formal operations task by age 9 or 10.<br>• show domain specificity in formal operations (Berninger and Yates, 1993).<br>• once they can conserve, move through sequence rapidly, do so simultaneously in several contexts (Roberts, 1981).<br>• having learnt a concept, apply it more widely and use wide active inference (Heller, 1979)<br>• have richer and more differentiated networks of meanings (Heller, 1979). This allow them to search for stimuli that help to complete their structure and show generalized assimilation, applying a scheme to all stimuli available.<br>• operate as big picture thinkers, pattern seekers and form general principles that apply to all domains, following feedback from few encounters<br>• don't generalize as much within a domain on the most difficult problems; have general principle but don't consistently apply it. |
| **Vygotsky proposed**<br>• we make sense of the world through our social interaction with others, particularly in how we jointly solve social problems<br>• we symbolise the world using socially determined and valued<br>  • tools; actions for solving problems<br>  • signs; gestures, icons, symbols<br>• Zone of proximal development' ; difference in how a person can solve problems without and with social support.<br>• Self talk as a mediator for managing learning Provide opportunities for negotiating meaning in learning. | Implications of Vygotsky for giftedness Do gifted students<br>• have past social interactions, social problem-solving that differ from others ? Do their parents begin to mediate learning earlier, manage parent-child interactions differently ? Parents of pre-school gifted children model and foster metacognitive strategies more than parents of normal ability children, particularly during problem solving (Moss, 1990). Gifted preschoolers more likely to predict consequences, reality test and monitor their thinking<br>• internalise different social tools and signs ?<br>• internalise tools and signs more easily ?<br>• differ in their cultural experiences ?<br>• have more highly developed iconic and linguistic coding systems ?<br>• operate more easily in the ZPD (easier to scaffold, self-scaffolding) ? How might gifted students manipulate the ZPD ?<br>  • Can have their existing knowledge be scaffolded by higher level thinkers ?<br>  • Do they need to be scaffolded in ways that allow them to pursue their own interests in learning ?<br>• Some gifted students show a smaller ZPD when peers or teachers provide the scaffold; they prefer to manage their own rather than learn in mixed ability groups.<br>• learn self talk more easily ? |

Task 5 Use the developmental trends in intellectual ability above to recommend ways of identifying early evidence of gifted learning.

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