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Diverse thinking styles of children: A pilot study

Acknowledgements

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ABSTRACT

This paper analyses the results of a pilot study designed to identify diverse thinking styles which teachers can encounter in a classroom. Using Sternberg's (1997) research on thinking styles, I argue that where there is a strong tendency to prefer a particular style, motivation may be enhanced through knowledge of that preference. My research also examines some of the major factors which may affect stylistic preferences, and examines correlations between gender, ethnicity and styles. Supplementary information contained within the appendices address style traits and various teaching strategies which may lead to more effective teaching of diverse learning groups.

INTRODUCTION

When teaching diverse learners, we owe it to them to remove as many barriers to learning as possible. An analysis of the diverse ways in which children think increases our understanding of their individual styles and approaches, and enables us to motivate children better. A knowledge of our own thinking styles can only increase our own ability to reflect upon our teaching practice, and lead to more effective learning and teaching.

Durie (1997) recognises the importance of multiple learning styles in his vision for Maori education. "Teacher recognition of multiple learning styles and the competency to help new learners become more successful through building from those learning styles they initially favour to others which extend the learners' repertoire effectively" (p. 39).

Sternberg argues (p. 160) that "if we don't take styles into account, we risk sacrificing some of our best talent to our confused notion of what it means to be smart or a high achiever, when in fact some of the smartest people and potentially highest achievers may only lack the style that we just happen to prefer."

Sternberg emphasises the variables of culture, gender, parenting styles and schooling which may affect thinking styles. My research pays particular attention to culture and gender and looks at factors such as teaching-learning style mismatches and assessment and task methodology which may contribute to a loss of motivation, create barriers to learning, and ultimately lead to lack of progress in all curriculum areas and a loss of self-esteem.

RESEARCH METHODOLOGY

- 1. Sample:** Data for analysis was collected from three separate sources. Sample A (decile 8) contained a complete class (14 girls; 15 boys) of Standards Three and Four children, who identified as European; and Sample B (decile 1) contained a complete class of children (15 girls; 8 boys) at the same level who identified as Maori. The questionnaire using Sample C (decile 5) was applied to all Middle and Senior school children (76 girls, 63 boys). This school has a diverse ethnic population.

2. **Ethical Considerations:** Participating schools were advised that information about the school, or any details that would enable individual children to be identified, would be withheld in the context of this paper. In addition, data relating to teachers completing the questionnaire has been withheld. School Principals decided whether parental consent was necessary, but this did not arise. In the case of Sample C, the survey was conducted at the request of the Principal.
3. **Instruments and Materials:** The Sternberg-Wagner Styles Inventory (Appendix A) used by Sternberg (1997) to collect his data on thinking styles was used as a framework for my own questionnaire (**Appendix B**), after having obtained permission from the author (pers.com. 23.3.99).

Sternberg's questionnaire was designed for use with college students and adults. His questionnaire consisted of eight questions for each style, with a choice of ratings from 1 (best fit) to 7 (least fit). I designed my questionnaire on the basis of four representative questions per style, with ratings from 4 (best fit) to 1 (least fit), having weighed all factors and decided that a questionnaire which was too long, or contained too many ratings, may compromise the integrity of the children's answers. However, three preliminary trials with a group of six children and three adults indicated, through feedback from the participants, that results obtained using this format were representative .

4. **Procedure:** The questionnaire was administered by the regular classroom teachers, who read through the questions with the children in order to ensure that the children understood each question. Each child completed the questionnaire independently.
5. **Method of Analysis:** Raw data was collated, and scores arrayed within each set (sets being Function, Form, Scope, Learning, and Level). Each style was allocated four statements, each being accompanied by four ratings (Appendix B). Respondents were required to rate each statement on a scale of 4 (greatest fit) to 1 (least fit).

Where comparative data is shown on some charts, figures are shown as an arithmetic mean (total score divided by number in cohort).

In Figure 4, the data was calculated as follows. Where the difference between the most preferred style and the next was greater than, or equal to, four points (25%), that style was deemed to show a positive preference. Where the difference between the least preferred style and the next was greater than, or equal to, four points (25%), there was deemed to be a negative preference.

5. **Limitations:** It is necessary to bear in mind that this is a pilot survey, designed with the intention of pinpointing possible flaws. The questionnaire itself probably needs further refining, so that there are more short, sharp statements per style. The

uppermost factor when designing the questionnaire was that of concentration of the children. The questionnaire, in its present form, proved to be short enough, and sufficiently visual and user-friendly, to engage and maintain their interest.

DISCUSSION

Key To Styles

Sternberg has used a Theory of Mental Self-Government to define his multiplicity of thinking styles. The comprehensive structure follows a metaphor of government, and describes functions; forms; and levels, scope and leanings. These are described here, together with the codes which are used on the charts when referring to the different styles.

Functions encompass *executive, legislative* and *judicial*.

- *Legislative (LG)* thinkers are creative, preferring to create their own rules. According to Sternberg (p. 20), "School environments do not often reward the legislative style." *Executive (EX)* people prefer to work within existing structures, rather than creating new structures.
- *Judicial (JU)* people like to evaluate and assess procedures and rules.

The term "forms" is used by Sternberg to describe "a different way of approaching the world and its problems" (p. 22).

- *Monarchic (MN)* thinkers are single-minded and often encounter problems through their tendency to pursue their field of interest to the exclusion of all else.
- A *hierarchic (HI)* person has a hierarchy of goals, and recognises the need to prioritise. The *oligarchic (OL)* thinker resembles the hierarchic thinker in many ways, but tends to be motivated by a range of goals which are perceived to be of equal importance.
- *Anarchic (AN)* thinkers, however, can encounter real difficulties within our society, as they appear to be motivated by a range of needs and goals which may be difficult to sort out. They take what appears to be a random approach to problem solving, extracting information from various sources and arranging it in a pattern which may make sense to them, but frequently does not make sense to those connected with them, although their solutions may be extremely innovative and workable. They also have a desire to challenge and test existing rules or systems.

The final tier of government embraces levels, scope and leanings.

- Individuals at the *global (GL)* level prefer to deal with large and abstract issues, in contrast to
- *local (LC)* thinkers, who prefer to work with concrete problems and deal with details.
- *Internal (IN)* individuals prefer to "apply their intelligence to things or ideas in isolation from other people" (p.25). These are the individuals who may appear to be less socially adjusted in the classroom. There are real issues for this type of thinker in light of the move towards co-operative learning.

- *External* (ET) individuals, on the other hand, prefer to work within a group wherever possible.
- The *liberal* (LB) individual tends to be the "thrill-seeker", who likes to maximise change. The *conservative* (CN) much prefers to adhere to existing rules and procedures.

Demographics

Table 1

<i>Girls</i>	NZ European	68	Maori	37	Total	105
<i>Boys</i>	NZ European	61	Maori	25	Total	86
		128		62		191

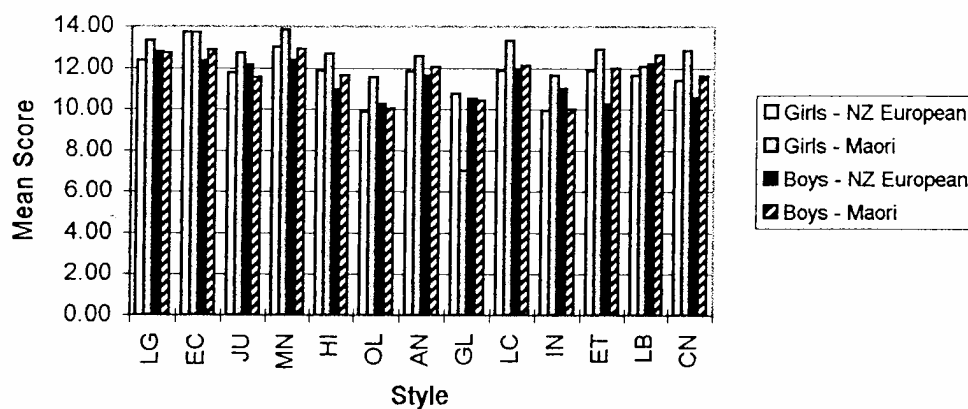
The total sample comprises all children from Samples A, B and C. Samples A and B comprise children from 9 years to 11 years, whilst Sample C comprises children from the ages of 7 years to 13 years.

Styles and Culture

Figure 1 shows the total scores allocated to each style by children in the sample within each ethnic group. Although it is interesting to analyse the general trend, it is important to remember that Dunn and Griggs study (1995) argues that all students, regardless of cultural or ethnic group membership, learn differently from each other; and that learning style differences derive more from gender than from culture. Maori children in this sample tend to describe themselves generally as being more external, whilst Maori girls describe themselves as being more local and less global than their NZ European counterparts. Both NZ European and Maori girls describe themselves as slightly more executive than both sets of boys.

Figure 1

Spread of Scores by Ethnicity & Gender



Interestingly enough, 74% of Maori children in the total sample listed mathematics as their most favoured subject, with 17% favouring art, in comparison to the NZ European children, of whom 45% favoured art, with physical education being the next most favoured (31%). Other choices were research, reading and music.

Perhaps this is not so surprising as it initially appears. Mathematics is not language based, and the pattern is more readily apparent. The English language contains very little pattern to those of us who have no interest in linguistics. In addition, there is increased interest in other countries in an area known as ethno mathematics. D'Ambrosio (1985) defined Ethno mathematics as the maths practiced among cultural groups such as national-tribal societies, labour groups, children of a certain age bracket and so on. Ascher (1991) notes that Architecture, Weaving, Sewing, Agriculture, Kinship relations, Ornamentation, Spiritual and religious practices which are often aligned with patterns occurring in nature or ordered systems of abstract ideas are all examples of ethno mathematics.

It is easy to find such parallels within Maori culture, in tukutuku, whakapapa, planting and harvesting patterns, and many games which are mathematically based, such as string games and board games such as mu torere. Mathematics is about thinking, problem solving, and working with what is known to give a framework and a method of exploring and understanding what is not known, about seeing relationships and patterns. It is also interesting to note that the skill of problem-solving, such as that found in mathematics, correlates positively with the executive style (Sternberg, p. 116), which was highly favoured by the Maori children in the sample.

Correlation Between Styles and Gender

Table 2 shows the style preferences exhibited by boys and girls in the total sample. It can be noted that some differences are marked.

Sternberg argues (p. 102) that "cultural consistencies in gender stereotypes are so remarkably high that we may have in such stereotypes one of the few true examples of cultural universals." Stereotypes are simply our perceptions, rather than realities. However, we tend to socialise girls and boys in terms of our perceptions. "Boys are more likely to be rewarded for a legislative, internal, liberal style, females for an executive or judicial, external, conservative style" (p. 102). There is support for this statement within this sample, which is particularly strong when applied to Conservative and Liberal styles. There is also a tendency within this sample for males to prefer the Global style.

Table 2

Style	% of Female Sample	% of Male Sample	% of Total Sample
<i>Legislative</i>	26%	41%	33%
<i>Executive</i>	57%	44%	51%
<i>Judicial</i>	17%	15%	16%
<i>Monarchic</i>	48%	48%	46%
<i>Hierarchical</i>	23%	21%	23%
<i>Oligarchic</i>	14%	8%	12%
<i>Anarchic</i>	15%	23%	19%
<i>Global</i>	24%	59%	27%
<i>Local</i>	76%	41%	73%
<i>Internal</i>	39%	45%	42%
<i>External</i>	61%	55%	58%
<i>Liberal</i>	56%	72%	63%
<i>Conservative</i>	44%	28%	37%

Children with a marked preference for an individual style can, according to Sternberg's theory, be uncomfortable and experience a loss of motivation when faced with a style which does not match their own. However, if choices are given, students will feel more at ease and motivated. Sternberg (p.43) gives an example of students' preferences when faced with literature tasks. A legislative student will prefer to make up his or her own story, complete with characters and plot; an executive student prefers to follow a teacher's advice and interpretations of a literary work; and a student favouring the judicial style feel more at ease when evaluating the author's style, criticising ideas and evaluating the characters. For legislative students, the question of ownership of their work is paramount.

Styles and Academic Performance

Sternberg argues that styles contribute significantly to prediction of course performance, after allowing for ability. His research (p. 132) showed that the judicial style contributed to performance on creative tasks, whilst the executive style contributed negatively. On practical tasks, the judicial style contributed positively.

Certain assessment measures also tended to benefit certain student preferences (p. 132). Examinations were most favourable for judicial students, and least favourable for legislative and global students. Independent projects were more beneficial for legislative students, and least beneficial for executive and anarchic students.

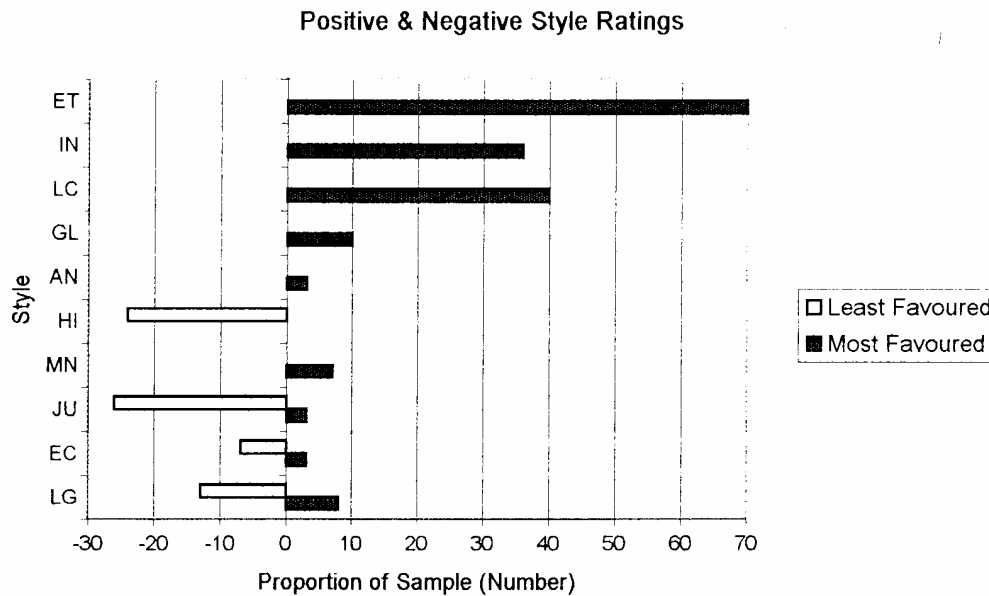
Figure 3 shows the thinking styles strongly favoured / not favoured by some children. Although many results showed a relatively even spread of stylistic preferences, indicating a degree of flexibility among children, a significant number showed strong positive or

negative tendencies towards certain styles. In light of Sternberg's research on rewarded styles, these findings are significant when analysing barriers to learning.

Positive & Negative Style Ratings

Total Sample = 191

Figure 3



Sternberg's research into thinking styles in the classroom (pp. 115-132), shows that certain styles are favoured within traditional assessment methods and task settings. When these methods and settings are taken into account, using Sternberg's summation, the data in *Figure 3* becomes particularly significant, particularly when one remembers the nature of such tests as the PAT and TOSCA. *Table 3* is adapted from Sternberg (p. 116), and shows the implications of each assessment method for children within our sample.

Table 3

Assessment Methods and Compatible Styles

Skill Required	Compatible Style	Negative Preference
Memorisation	Executive, Local	4%; 5%
Analysis	Judicial, Local	14%; 5%
Time allocation and organisation	Hierarchical	13%
Co-operative Learning	External	19%
Working by oneself	Internal	37%
Creativity	Legislative	7%

Correlation Between Styles and Schooling

Sternberg posits that styles are socialised. His evaluation of teaching styles within schools tended to show that "teachers tend to match the stylistic ideology of their schools. Either teachers tend to gravitate to schools that fit them ideologically or else they tend to become like the place they are in" (p. 129). This, then, implies that socialisation of styles continues even at the adult level.

Further school studies conducted by Sternberg showed that there was a significant degree of match between teachers' and students' styles. There is an important factor within Sternberg's research, in that "students performed better and were more positively evaluated by teachers when the students' styles matched, rather than mismatched, the styles of their teachers" (p. 130). My research also supported Sternberg's findings, in that many children tended to mirror the thinking styles of teachers.

However, mismatches did occur within classrooms, and it was significant that these affected the teacher's perception of the child. Mismatches in my study, however, tended to occur where there was a strong preference (4 points or more) difference between the predominant preference and the next highest scoring style. We are all aware of comment from parents that a child "did better with one particular teacher rather than another."

The factor of mismatches between teacher and student learning preference is significant within Sternberg's study. The following table (Sternberg, p.116), has implications for our New Zealand classrooms also:

Table 4

Thinking Styles and Methods of Instruction

Method of Instruction	Style (s) Most Compatible With Method of Instruction
Lecture	Executive, Hierarchical
Thought-based questioning	Judicial, Legislative
Co-operative (group) learning	External
Problem solving of given problems	Executive
Projects	Legislative
Small group: students answering factual questions	External, Executive
Small group: students discussing ideas	External, Judicial
Reading	Internal, Hierarchical

It is a notable feature of this table that three styles of thinking, the monarchic, oligarchic and anarchic, are absent, whilst the internal thinking style is under- represented.

It becomes apparent from this data that teachers need to employ a wide range of teaching strategies within their classroom in order to reach all children. Carbo and Hodges (1988) state that matching students learning styles with appropriate instructional strategies improves their ability to concentrate and learn (p.48).

Pogrow (1994), advocates a three-pronged approach which includes creating a learning environment which is constantly intriguing; combining visual and interactive elements together with the Socratic model which enables students to look for answers within themselves; and developing what he terms "cognitive architecture" to unify learning experiences.

A further model is that addressed by the Cognitive Flexibility Theory (Spiro & Jehng, 1990) which has five main points, addressed briefly as follows:

- Present a concept from many different points of view.
- When introducing abstracts, illustrate by using varying examples.
- Rather than breaking down complex topics, introduce complexity through clear examples.
- Stress the interrelatedness of concepts.
- Encourage knowledge assembly (as opposed to a standardised schema).

CONCLUSION

Perhaps the most significant factor within this survey is that of the correlation between styles and academic performance. If we are to take Sternberg's research into account, it appears that there is a very real chance that children may be disadvantaged in the classroom not only by insufficient flexibility within teaching styles, but by our current methods of assessment. This is particularly true within our secondary schools, because of the necessity to educate children to the standards required by the employment market.

This study has attempted to address the broad implications of diverse thinking styles within the classroom, analyse group trends and, more importantly, has begun to look at the necessity of addressing these diverse thinking styles to ensure that individual children are not disadvantaged. No matter how significant group trends may be, it is still more important that we recognise that different children learn differently.

Eysenck and Eysenck (1989), argue that

A teaching system which fully recognised personality differences is more likely to be based on the methods used in many infant schools; in other words it would provide a variety of approaches and tailor those approaches to individual children ... Above all, prospective teachers, and existing ones too, need to be taught the facts of personality and teaching strategies and systems... Given some knowledge of behaviour patterns, and provided with questionnaires to test their pupils, teachers should be able to work out the best methods of motivating and instructing children (p. 207).

A questionnaire similar to that used in my study could be developed into a teaching aid, to be completed by teachers and children at the beginning of the school year. Using this information, classroom teachers could work together to capitalise on their style strengths and reflect upon their teaching strategies with the children in their class. Felder (1996) states that teachers need to discuss thinking styles with the students, and then work through the material with each individual, so that areas of strength could be pinpointed, and strategies put into place to encourage flexibility within styles.

An analysis of thinking styles of both teachers and children within every classroom would enable classroom teachers to capitalise on stylistic strengths of children, analyse and reflect on their own teaching styles, and encourage flexibility within styles. Styles are

flexible; they can be modified and they can change over time or within different situations. A child whose style preference is valued and addressed is far more likely to feel motivated to learn than a child who simply feels that he or she is different.

An effective programme would be one where teachers and children are aware of their preferences, and teachers employ a broad range of strategies to address all styles. Children should be given the opportunity to work alone or within groups, and offered choices about the way they approach their work and deliver the final presentation. Where group work is undertaken, children should work both with those whose styles are complementary,; or with those whose styles are different to encourage flexibility and acceptance of an approach which differs from their own. When we are aware of our positive characteristics we are encouraged to develop them. An awareness of other styles also enables us to broaden our own. *Appendix C* provides a brief oversight of thinking styles and some appropriate teaching and learning strategies, using Sternberg's research (1997) as a basis.

Sternberg (p. 18), argues that "... what happens to us in life depends not just on how well we think, but also on how we think. " We should consider the implications of that statement. Despite the proliferation of thinking style theories, "schools and other institutions, from households to businesses to cultures, value certain ways of thinking more than others", continues Sternberg (1997, p.8).

I believe it is our task, as educators, to develop teaching strategies which will address all learning styles and enable each learner to maximise his or her potential. Students can, thereby, develop skills in areas which society perceives as being necessary to success, and recognise that their own preferred styles are a valued part of their individuality and diversity.

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