Challenging The Assumptions:
The Motivation and Learning of Children Who Have Developmental Coordinaton Disorder

Lois Addy
University College of Ripon and York St. John, England

Editor's Note: This paper has been edited for brevity. For a copy of the entire text including please contact the author directly.

Learning is the process by which we begin to understand the environment in which we live. Children develop their knowledge about their world by exploring their surroundings, investigating relationships between objects and people, and developing an understanding as to how these relate to the overall scheme of events. The school years are fundamental to increasing the child's understanding about his/her world and his/her role within it. They learn how to problem solve, make decisions, form opinions and discover their own values. They evaluate their own competence while at the same time assessing those skills which they cannot do well, thus they learn to succeed, expand, manipulate, avoid, and struggle with concepts which are essential to their future role and position.

This small scale study seeks to look at the impetus to learn, not from the adult perspective--but from that of the child. It particularly focuses on those children who have difficulties in their motor co-ordination, formerly known as developmental dyspraxia (Ayres, 1972. Denckla, 1984) and now termed as Developmental Co-ordination Disorder (American Psychiatric Association, (A.P.A) 1987). It questions whether children with motor co-ordination disorder adopt different learning styles to those of their peers because of their awareness of their abilities and weaknesses. It questions assumptions made by remedial therapists, the child's parents and his/her teachers regarding the learning style the child will adopt and whether these influences are indeed correct or whether the understanding of the clinical condition affecting these children actually hinders our appreciation of individual uniqueness.

The Learning Skills of Children with Developmental Motor

Co-ordination Disorder

There are a significant number of children within the mainstream school setting who appear to have notable motor co-ordination difficulties with associated deficits in visual perception skills. There are a variety of hypotheses as to the reasons for this including the increase in premature births with a lack of maturation of the brain's motor integration system. Trauma around the time of birth may result in minimal brain injury which seriously affects the child's motor planning. Dysfunction in the integration of the vestibular, tactile, and proprioceptive systems, with its subsequent effect upon visual and hearing perception, within the subcortical / brainstem. Even familial tendencies have been recorded by Hadders-Algra et al, (1986). This results in the child being unduly clumsy, having difficulty dressing, performing physical skills such as hopping, jumping, balance, while at the same time struggling with many aspects of their academic performance.

Children with Developmental Co-ordination Disorder usually have average or above average intelligence but do not achieve their potential (Maeland, 1993). They struggle with many elements in the curriculum and are classically classified by their clumsiness in class which is often a source of irritation to both their peers and teacher, and a source of frustration for the child. Their handwriting tends to be poor with erratic sizing of letters on the page due to poor size discrimination, as adequate visual tracking and form perception are vital to controlled movements (Hulme, et al. 1982) Their drawings are usually very basic which reflect their poor self image and distorted body schema. Their understanding of 3 dimension is also affected by poor depth perception and figure-ground perception, elements which are particularly important for movement and motor performance (Hulme, 1984). This consequently affects their ability to undertake practical experiments, or craft activities. Poor figure-ground discrimination skills also affects the child's ability to focus on specified tasks which in turn results in the child becoming easily distracted and often leads to either disruptive behavior, or to day dreaming. The additional affect of auditory figure-ground discrimination exacerbates this dimension, especially in an active classroom of 25 plus children. Poor motor organisation also leads to difficulties in using scissors, rulers, compasses, and subsequent success in undertaking creative activities. Physical education, due to the child's poor motor planning is seriously affected; often they are given the position of substitute in team games so that the game will not be disrupted by their clumsiness, or as a second goal keeper. Their peers either avoid or "mother" the child, often they are ridiculed for their untidy appearance, or poor efforts in drawing and writing. Reading is usually very good so more time is given to this than other activities. Overall the child's school days can prove rather motiveless.

The result of this dysfunction is a child who is very frustrated, with a low self esteem and a lack of self confidence. The children's needs are not usually identified until the child is 6 or more years old, as prior to this it is almost acceptable to be somewhat lacking in co-ordination and the fine refined motor skills, essential in many tasks particularly handwriting, are not in such great demand. It is sufficient time however for a child to learn what they can and cannot do and how they feel regarding this. It is long enough for the child to work out how to avoid tasks which they know they will be unsuccessful in. It is allows time for teachers and other adults involved in educating the child to label the child as difficult, low achieving, irritating, and disruptive. These labels are difficult to displace.

Purpose

This study seeks to explore a variety of dimensions regarding those factors which

influence the motivation to learn of children with developmental co-ordination disorder. It seeks to answer the following questions:

1. What are the motivational factors which influence children with motor learning problems to learn?
2. Do their learning styles vary significantly to that of their peers?
3. Are there assumptions made by their carers, teachers or remedial therapist which influence their ability to learn?

Method

Twenty five children aged between 8-12 years with recognised developmental co-ordination disorder took part in this study. The children were all diagnosed following a referral to their Child Development Centre. All attended mainstream primary schools in the local area, they did not belong to the same school. The group consisted of 5 girls and 20 boys.

The children all had marked motor co-ordination weaknesses, the majority being highlighted using the Movement ABC battery (formerly the T.O.M.I.) They also presented with uneven visual perception profiles depicted using a variety of assessments Gardner TVMP, Frostig test of visual perception, Beery, and Good-enough Harris Draw a man test.

These children were asked to complete the Learning Combination Inventory (Johnston 1994). This consists of a series of 28 statements regarding how a child may learn.

To complete the questionnaire the class were introduced to the theme of "How would you like to be taught?" and "How would you teach if they were the teacher?" The children completed the inventory following this and the teacher and myself moved around the room clarifying any concerns or misunderstandings the children may have had.

The results were later analysed according to the scoring sheet attached to the inventory, this resulted in a summary of each child's unique learning combination. This emphasised the factors which influenced the child's motivation to learn. The schemas accentuated through this analysis were classified as Sequential processor, Precise Processor, Technical Processor, and Confluent Processor.

The four learning schemas describe the combination of learning strategies which children may adopt, with perhaps only a marginal bias to one over another. Different strategies are adopted for different occasions. Johnston (1995) in her development of these styles sees a child appropriating a combination of learning styles, having a preference towards one or another and reluctantly using others as necessary.

The information gathered from those children with Developmental Co-ordination Disorder was collated and a summary drafted which included information regarding each child's learning combination. This included those learning styles which the child avoided and those which they preferred to use. These were supported by the qualitative statements made by the child regarding the open ended questions.

The information regarding the 25 children with recognised Developmental Co-ordination Disorder was then sent to their occupational therapists to establish their views regarding the child's style. The questions asked can be seen in Appendix I.

The results of individual's learning styles were also discussed with many, although not

all, teachers concerned. This inability to gain feedback from many of the teachers involved in the evaluation was due to the time scale. The data was collected during the Summer Term (April -July), following this term many of the children transferred on to Secondary schools or to a new class where their teacher had not had the opportunity to develop an understanding of each child's skills, talents, interests nor their attitude to learning therefore the information from the collated results would not be an informed contribution. The analysis of these will be, on the whole, qualitative although a small quantitative analysis will be included.

Results

The Learning styles adopted by children with developmental co-ordination disorder.

The children's responses to the 28 statements led to the collation of a scale of learning combinations used by each individual child. These correlated with the statements the children made in answering the three open ended questions and validated, to some extent, the learning combination of each child. For example, James' learning combination directed him to using predominantly technical processor schema along with elements of using confluent learning styles, and an avoidance of the precise processor schema. This was supported through his responses to the three open ended questions regarding his views on what motivates him to learn. He stated:

> *I hate doing any type of sums especially those on worksheets or in workbooks, it would be better if the sums were a bit more practical and even relevant to me. I prefer to learn by watching demonstrations, then having a go myself, I also like to make things, collect things, and invent new things. I could then show the teacher these things and she would realise what I know. She could also ask me lots of questions, I wouldn't mind that so much.*

There were several common themes highlighted by the children with developmental co-ordination disorder which are significant in understanding the motivation of children with specific learning difficulties. Their responses to "what makes school work hard for you?" were particularly poignant.

Twenty three out of the twenty five children in the study expressed their dislike of **mathematics** and their feeling of failure in this subject. This corresponds to Kosc (1970) and Sears (1986) findings relating to that which they term **dyscalculia**. Sears in particular accentuates a correlation between poor visuo-motor co-ordination and aspects of visual perception, such as spatial organisation and position in space, and arithmetic. Wood (1991) suggests that this is partly due to the child's inability to set out the sums correctly which in turn impedes the learning process. Keyboards have been introduced but this involves the composite use of cursor control keys and still layout proves to be complicated. There are several solutions to this quandary; to return to a more practical approach to mathematics, or to assess some of the computer programmes available which specifically simplify the layout and presentation of the numbers required. An example of such a programme is "The Simple Sums" programme designed by Dundee University.

Handwriting also proved to be a feature with which the children expressed their concern and feelings of inadequacy. Twenty two out of the twenty five children with developmental co-ordination disorder expressed their dislike of activities involving handwriting. They stated that their writing was too slow, untidy and, according to their

teacher, often illegible. Considering a fundamental part of the child's school day is devoted to written work, with one third of the school day focusing on handwriting relating to language tasks, one quarter of the day being devoted to writing tasks related to general studies including topic work, and a further proportion relating to writing related to mathematics (Graves, 1978) this has a crucial bearing on the child's will to learn. It leads us to consider whether there is any alternative to the extent of writing so much within the school day.

This questions whether more use could be made of alternate means of recording a child's knowledge such as the use of recorders or Dictaphones, verbal exercises, drama, role play activities, and demonstrations. It also challenges the reluctance to use taped information to enhance the child's learning and to maximise their use of their auditory memory skills. Such an approach was used for a child who, due to extreme visual figure-ground discriminatory difficulties, could not learn well by reading, as he frequently lost his place when visually scanning the page. It was noted by his mother that he could remember lines from a song played on the radio after hearing it only once. This child had learned to use his auditory skills to compensate for his weak co-ordination and visual perception skills. This approach to learning was subsequently encouraged and the information he required for his graduation examinations was provided on cassette. This child succeeded using these. He was allowed the opportunity to learn in the way that suited him and to be given the opportunity to express his knowledge without the frustration of needing to read and write.

Many of the children in the evaluation appreciated that hand-written information was a necessary aspect of school learning. Many suggested that this could take the form of worksheets containing limited information on them, to prevent it from appearing too cluttered, a dilemma for those with visual figure-ground discrimination. They also suggested that an occasional picture may increase the interest in the subject.

Almost all of the children in the Developmental Co-ordination Disorder group expressed their preference for **learning by listening** as the teacher explained subjects or events, however this was relating to didactic discourse rather than small group teaching which was felt to be a source of distraction. Demonstrations relevant to the given subject, again involving the whole class or small group outside the bustle of the classroom was a preferred means of learning. This discrepancy between the child's learning through front of class teaching as opposed to self directed learning reiterates the teachers comments when the child is first referred for help. The child is often described as having a good grasp of general knowledge and can contribute to class discussions well, however they cannot seem to concentrate in everyday class activities nor record the information they have previously discussed. The frequent assumption is that either they are "dyslexic" or a have some form of behavioural problem which prevents them from working alone. The actual difficulty is that of **attention**.

Seven out of the twenty five children expressed their frustration in being unable to concentrate and attend well, being easily distracted in class by others conversation. This reflects an area, being increasingly researched, that of auditory figure-ground discrimination. In a similar way to that of visual figure-ground discrimination, the child with **auditory figure-ground discriminatory** problems finds it difficult to focus their attention to one field, he/she is unable to "switch off" from other auditory information within the room, hence becoming easily distracted and frustrated by their inability to absorb the information required by the teacher. Their comments reflect this:

> *The teacher makes classroom learning hard for me by telling different groups of children to do different things. It becomes confusing. I really don't like distractions when I'm trying to work.*

> *I need the teacher to tell me the instructions as to what she wants me to do on my own, as when she tells the whole class and then we go back to our seats, I get distracted and forget what she said, if she told me again*

*slowly and then checked that I've got the gist of it when I've sat down, I'd
be OK.*

*I need to have someone who understands me to sit next to me and
explain again exactly what I'm meant to do after the teacher has told the
whole class.*

*I get into trouble at school quite a bit, it's quite frustrating really as I sit
next to someone who chatters a lot and then I don't get my work done as
I'm distracted by them. It's unfair.*

One of the most significant considerations, which emerged from this study, was the affect of the success at school on the child's **self esteem, self confidence and relationship with others**. Seventeen of the children involved in the study spontaneously expressed their incompetence in "keeping up" with their peers, being as proficient as their peers, and being accepted by their peers. This reinforces Maslow's theories of a person's need to be accepted as an important aspect in the process of self actualisation. He believed there were dangers in basing self-esteem on the opinions of others such as teachers and peers and felt that healthy self esteem is based upon personal achievement, and deserved respect (Adair, 1990). The difficulty with this is the child's clear cognisance of their own inadequacies. This emphasises the responsibility that those involved in the teaching process have in enabling the child determine their talents, strengths and to augment these.

These comments were made regarding their work and how it was often deemed unacceptable by their teacher or peers:

I don't like sums or writing, I'm not very good at either.

I'm rubbish at drawing and painting, everyone laughs at my efforts.

*I hate handwriting, it takes up so much effort and it never looks as good
as everyone else's.*

*I really find friendships so difficult at school, because so many subjects
are hard for me, I seem to get teased all the time.*

This reflects the experiences of children with Developmental Co-ordination Disorder in that they appear to "fail" in the classroom, despite their intellect and understanding. It also emphasises their awareness of how this failure affects their self esteem and confidence in relation to establishing relationships with their peers and the frustrations this imparts.

This lack of self esteem appears also to be compounded by certain tactics adopted by the child's teacher which has been misconstrued as punishment. The suggestion of writing work out again more neatly or to practice certain aspects of handwriting over and above that of the rest of the class, is not viewed as helpful, but as a reminder that the child's work is not as acceptable as that of his/her peers and therefore not as good. The compositional aspects of the piece of work are shielded by its illegibility or poor presentation. The view that practice makes perfect often has the adverse effect on these children who are in danger of suffering what Cratty (1985) termed as **"motivational burnout"** caused by the intensity of repeated practice. Cratty coined this term in relation to physical training but this can also be seen in situations where children have to, for example, repeatedly practice letter formation. This burnout takes the form of anxiety, tension, and a reluctance to enjoy writing tasks. Motivation has ceased. This is where it is important to apply alternatives to subjects which the child finds arduous.

The other consideration of repeated practice is that of **"skill generalisation"**. There is

no guarantee that skills practised repeatedly in one situation will be generalised to another. Denkla (1984) found that "persons given the advantage of training or over practice on essential motor skills (be they fine or gross motor) may enter adult life without obvious difficulty, unless challenged by new skills to learn". It is then that generalisation needs to take place and previous motor plans retrieved to co-ordinate the new activity. Denkla found that by focusing too narrowly, skills were compartmentalised and new skills proved difficult.

Several of the children in the group explained that they would like to **show** their teacher or therapist how much they know by bringing their stories, poems, letters and drawings which they have produced at home, and to share these with their teacher and the rest of the class. This suggests that the child feels more able to express themselves and explore their own creativity outside the classroom setting. It suggests the need to create an environment which allows freedom to experiment and explore aspects of creativity and composition, an environment which is free from distractions, time limitations, competition and pressure to succeed. This view was reiterated by the children's parents.

Apart from the themes, which were accentuated by this study, in which aversions to written work, mathematics and non verbal activities were prevalent, the individual nature of each child was highlighted. Each child used learning schemas which reflected their individual personality. Each demonstrating a unique combination of learning strategies used according to their varying learning environments. It was interesting that despite the concerns expressed by the children regarding their struggles with classroom learning that they did not necessarily rely on using one schema over another. Their preferred approach to learning did not altogether reflect their difficulties, rather it reflected their uniqueness and individuality. For example, one child, who not only had motor co-ordination difficulties but also dyslexia, used her sequential and precise processor schema to learn. Despite her poor visual sequential memory for spelling and reading and poor co-ordination for writing she still preferred to learn by absorbing detailed facts, visual information in a way she could construct. She did not adopted a schema which was more creative or relied on a more overt demonstration of her knowledge such as that of the confluent processor. It was this uniqueness which has challenged the opinions of professional and provided a creative dilemma for those adapting the curriculum to meet the disposition of each child.

A Challenge to Assumptions!

Occupational Therapists, like teachers and other remedial therapists involved in education, aim to enable children to obtain their potential in terms of independence, self worth, and functional abilities. As Developmental Co-ordination Disorder has a profound effect upon a child's ability to record information and perceive his/her environment in the same way as his/her peers, a responsibility for enhancing the child's potential rests with those involved in this process. Although there are contradictory views as to whether Developmental Co-ordination Disorder is fundamentally a neurological condition or that of a maturational lag, we still have a service to play in encouraging each individual child to achieve their potential.

There are a variety of approaches used to enhance a child's co-ordination and perceptual skills. Examples are: task orientated approaches based upon cognitive-motor training as advocated by Stott, Moyes and Henderson (1972) and Kirshaw (1973); process dysfunction approaches, for example Sensory Integrative

therapy (Ayres, 1983) (Chu, 1993); process oriented approaches based on perceptual-motor training, (Bairstow and Laszlo, 1985. Frostig ,1973) along with the more specialised approaches such as psychomotor approach of Dalcroze Eurythmie, (Dalcroze, 1967). Whichever method is adopted, it is in essence a taught approach, just as that of a teacher in education.

In order for the most appropriate choice of therapeutic intervention to be offered, a detailed assessment regarding the child's motor skills, visual perception, and personal concerns is required and decisions are made regarding the most suitable approach to adopt and in which location. Simultaneously, teachers formulate similar strategies to enable the child to learn. These two approaches are frequently brought together to provide a consistent, comprehensive modus operandi to enable the child to learn. The following aspect of the study sought to assess whether the procedures implemented were compatible with that of the child's own learning schema and whether, by looking at individual learning styles, the distinctive nature of the child can be incorporated into the teaching process.

The Occupational Therapists involved were given a summary of the learning schemas adopted by each of the children with whom they were involved. This included a description of the learning schema the child used most frequently alongside that which he/she avoided. It also summarised the information provided by the children regarding their views on how they would like to learn. They were then asked their opinions regarding the results and how these might affect their future approach.

Twenty three out of the twenty five respondents felt that the description given of the child and the way they tackled subjects was indeed an accurate reflection of the child's personality. One of the therapists felt that two of the children, whose results led to them being described as creative, did not reflect the nature of the children concerned. In one of these cases the term creative was applied to the use of the technical processor schema rather than the confluent processor. The creativity expressed by the child was that of enjoying practical demonstrations rather than creativity in the sense of drama, role play, story writing. The other child that the therapist did not feel was particularly creative was a child who used a variety of schema as appropriate, not having a definite preference for one over another. It may be that we can assume that this child has not had the opportunity to explore this aspect of their learning within the therapeutic setting.

An element of surprise was expressed by the results of a child who has Developmental Co-ordination Disorder and dyslexia, children with this dual dilemma often relate to more creative learning approaches, avoiding the processing of complex instructions and details. This child showed a strong preference to using the precise processor and sequential processor schema. This was supported by her views regarding how she would like to learn and highlighted the fact that trivia and the gathering of detailed information regarding relevant subjects does not need to incorporate volumes of written material nor need to involve profuse writing skills. The information provided by this child and the detail regarding how she would like to learn will be used by her support teacher to encourage her learning. This will involve more use of video information, educational cassettes and computer aided learning. The impression that this child would be motivated to learn through more creative, craft and art type activities was incorrect.

Several children within the Developmental Co-ordination Disorder group responses stressed their use of a more creative, practical approach to learning, enjoying taking things apart to see how they work, constructing models, and undertaking experiments. This surprised many of the therapists who felt that naturally this schema would not be adopted due to the child's **poor manual skills** and the potential feeling of failure. One therapist wrote

I'm not sure about her preference for enjoying practical activities They are so difficult for her, I thought these would be avoided!

This was not the case as the majority of the Developmental Co-ordination Disorder group preferred a more practical outlet to education. Perhaps this is due to the sensory benefits of practical work. The child being able to explore the properties of the subject through the exploration of texture, weight, temperature, and other properties which reinforce the integration of a child's tactile, vestibular and proprioception, thus helping them in their struggle for sensory integration, or could it be a subject which avoids the necessity for profuse handwriting!

At times the learning style adopted by the child were seen as **preventing** them from achieving their potential. One child whose learning schema used was that of the confluent processor was felt to use his own ideas too much without the flexibility of compromise and appreciation of others views. This child was described as "almost obsessional" in that whatever he did he became almost too involved. He spent a considerable amount of time relating to details of films and the dynamics of the relationships within these. He constantly questioned "What has this to do with me?" "How do I fit into this?" The therapist concerned felt that a balance of learning schema was required in this case. There was a danger of perpetuating what appeared to be negative thinking patterns. In this situation, the child also related to a difficulty making and retaining friends, so the suggestion by his therapist to broaden his appreciation of other styles seemed appropriate.

One child who expressed his preference for using his precise and technical learning schema was supported by his therapist. She commented that he was a practical little boy, somewhat solitary and not always confident in his schoolwork. She felt that any small criticisms set his progress back. This reinforced the child's request for detailed instructions to be given before attempting any new task and a preference for using demonstrations rather than written work. His therapist has agreed to share these findings with his teacher so that applicable learning strategies can be adopted.

The results of the childrens' impressions caused some speculation as to whether it would be beneficial to attempt to address the child's avoidance of one schema over another, or indeed whether strong preferences for one approach over another was indeed appropriate or reflected an imbalance in learning. Certain therapists confessed to inadvertently encouraging the child to use the precise processor schema which they felt would be more appropriate at school. This approach was used to encourage children who usually adopted technical processor schema, who hated recording facts and details, preferring hands on, practical work to conform with the requirements of the school curriculum. They felt that the children had to learn how to record details and to be able to scribe well to consume the necessary facts given by the teacher which would, long term, be a requirement of Secondary Education.

On the other hand, some therapists sought to use the schema adopted by the child to encourage their learning and enable them to enjoy their learning more. They also felt that by sharing this information with the child's teacher, they might be able to make the school a happier place for these children.

Some of the responses led to increasing the therapists awareness of the child's tactics used at school to assimilate and understand information. Regarding one child whose schema pointed towards a preference for sequential processing.

She always seems to cause a delay before beginning any work. i.e. by talking, blowing her nose, sorting out her pencil case etc. I always assumed that this was her way of avoiding work, but perhaps it is fair to think that her delaying tactics are related to her learning style!

Others commented:

> *Our therapy sessions tend to be "child led" which allow for his creative expression so its good to know that therapy is suiting him in that sense. However I will endeavour to elicit more of his practical creativity in future as highlighted by his responses to the questionnaire.*
>
> *I would not regard him as that creative, he used to go off at a tangent away from the intended task. I used to think that he didn't want to deal with the subject but perhaps the truth is that he wanted to do it his own way and I was being too restrictive." (said of a child who preferred the confluent processor schema)*
>
> *I'm not sure that I agree about the description of this child. He would rather listen and tell than write down facts and figures because of his handwriting difficulties. He is a timid boy though he has a dramatic side to his nature" (child who uses the precise processor schema)*

There is an assumption here that in order to absorb facts, the information must be written down. In this case the child expressed his preference to listening to the teacher than writing things from books.

The opinions sought from the therapists provided a valuable focus in which to debate the motivational influences of each child both to learn at home and at school. **The results challenged therapists about their way of working, their orientation towards a child centred approach to therapy and the possibility of looking at new ways to enable the child to learn without the pressures of academic conformity. It challenges the view that a child will be motivated by that which he/she is successful in at and will avoid those things he/she will fail. The parents views reinforced the need to understand each child's individuality and to enable them to explore in a secure, safe environment those aspects of the curriculum which is usually difficult. It also provided insight into the child's concerns regarding his/her education and a challenge as to how therapy and education can come together to encourage the child's integration and subsequent independence.**

Summary

The use of the Learning Combination Inventory has been an interesting tool in provoking debate and discussion amongst educationalists and health care professionals working with primary aged children. It has accentuated those dilemmas faced by children with Developmental Co-ordination Disorder compared with those of their peers and has raised questions about how these dilemmas can be addressed.

A dual challenge has been set. How do we encourage a child who is fully aware that their performance is different to that of their peers, and not in keeping with the expectations of their teachers or parents. This being demoralising leading to feelings of hopelessness and low self esteem. Alongside the challenge, of enabling their educators to find ways of nurturing, strengthening and facilitating the child's intrinsic motivation to learn. While simultaneously encouraging an increase in the child's global self esteem which includes competence, power, moral worth and acceptance (Harter, 1989).

Follow On

This study has provoked much discussion and debate amongst teachers, pupil support services, parents and remedial therapists alike. As a result of this, there have been certain implementations which aim to benefit not only the child with Developmental Co-ordination Disorder but other children also. These include:

1. Several study days have been developed to assist teachers, pupil support workers, non-teaching assistants and remedial therapists in their understanding of how DCD affects the child's academic attainment and his/her motivation to learn. Issues highlighted through this study have been incorporated in these days. (to date 156 professionals have accessed these days)

2. Three of the children in the DCD group, whose effort in handwriting were severely affected by their motor control have been assessed for the provision of a voice activated computer. Their motor co-ordination made typing also a laborious exercise.

3. Approximately ten children are now using electronic typewriters or lap top computers to augment their written presentation.

4. Several therapists involved in the study have expressed their desire to use the Learning Combination Inventory as part of their initial assessment, in order to increase their understanding of what motivates the child, prior to developing a therapeutic programme.

5. The results of the majority of the children's learning styles have been discussed with the professionals involved in order to review ways in which the child's comments could be used to enhance their learning.

Lois M Addy, MA (Ed) Dip COT SROT
University College of Ripon and York St. John
Lord Mayors Walk
York YO3 7EX
England

Appendix I

Questions asked of parents following a brief description of their child's learning schema following the analysis of their responses to the Learning Combination Inventory.

1. Do you think that these results reflect your child's personality?
2. In your opinion do you think these results are correct?
3. Do these results surprise you?
4. Do these results reflect that of yourself or your partner?
5. Will these results influence in any way the activities you might undertake with your child in the future?

Questions asked of Occupational therapists involved with individual children following a paragraph describing the child's responses to the Learning Combination Inventory.

1. Do you think that these results reflect the child's personality?

2. Were these results correct in your opinion?
3. Were these results surprising to you?
4. Would these results alter the activities you choose to use with the child in any way?

,

References

ADAIR, J. (1990) *Understanding Motivation*. Talbot Adair Press, Surrey. UK

AMERICAN PSYCHIATRIC ASSOCIATION. (1987) *Diagnostic and Statistical Manual of Mental Disorders*. Washington DC, USA.

AYRES, J.(1972) *Sensory Integration and Learning Disorders*. Los Angeles: Western Psychological Services.

AYRES, J. (1983) *Sensory Interaction and the Child Western Psychological Services*. L.A., USA.

BERKOWITZ, L (1964) *The Development of Motives and Values in the Child*. Basic Books Inc. New York, London.

BRENNER, M.W. GILLMAN, S. ZANGWILL, O.L. FARRELL, M. (1967) "Visuo-motor Disability in School Children". *British Medical Journal*. 4. pp 259-262

BRUNER, J. (1966) *Towards a theory of Instruction*. Cambridge (Mass) Harvard University Press.

BYNNER, J. WHITEHEAD, I. (1972) *Personality Dimensions and Motivation*. The O.U Press.

CARTER, C.F. (1973) *Motivation. Non-cognitive Aspects of Student Performance*. SRHE Publication. London, UK.

CHU, S (1993) "The Application of SI Procedures in Clinical Practice: Key Concepts and Treatment Principles". *Handbook for the Advanced Workshop in the Treatment of SI Dysfuction*. BISI.

CRATTY, B.J. (1986) *Perceptual and Motor Development in Infants and Children*. Englewood Cliffs, New Jersey. Prentice-Hall.

DALCROZE, J.E (1967) *Rhythm. Music and Education*. Pyrford. Woking. The Dalcroze Society.

DAVID, R. et al (1981) *Proposed Nosology of Disorders of Higher Cerebral Function in Children*. Child Neurology Society. Unpublished manuscript.

DAY, H. I, BERLYN, D.E., HUNT, D.E, (1971) *Intrinsic Motivation- a New Dimension in Motivation*. Holt, Rinehart, Winston Ltd. Toronto, Canada.

DENCKLA, M.B. (1984) *Developmental Dyspraxia. The Clumsy Child* in

LEVINE, M.D SATZ, P. *Middle Childhood: Development and Dysfunction*. Boston: University Park Press.

DUNN-RANKIN, P. SHIMIZU, M. KING, F. (1969) "Reward, Preference Patterns in Elementary School Children". *International Journal of Ed. Science* Vol.3 pp 53-62.

ENTWISTLE, N.J (1968) "Academic Motivation and School Attainment". *British Journal of Psychology* 38. pp 181-199

FROSTIG, M.(1973) *Frostig Program for the Development of Visual Perception*. Chicago. Follett Pub. Co.

GRAVES, D. (1978), *Balance the Basics: Let Them Write*. New York: Ford Foundations.

GUBBAY, S.(1975) *The Clumsy Child. A Study of Developmental Apraxic and Agnostic Ataxia*. WB Saunders Co Ltd. London, UK

HALL, D..M.B (1988) "Clumsy Children". *British Medical Journal*. 296. pp 375-376

HARTLEY, J. HOLT, J. HOGARTH, F. (1971) "Academic Motivation and Programme Learning". *British Journal of Educational Psychology*. Vol.41. pp 171-183

HENDERSON, S.E. HALL, D.(1982) "Concomitants of Clumsy Children' in Young Schoolchildren". *Developmental Medicine and Child Neurology* No 24. pp 448-460

HOWE, M. (1972) *Understanding School Learning: A New Look at Educational* Psychology Harper and Row Publications. New York, London

HULME, C. LORD, R (I 986) "Clumsy Children--A Review of Recent Research". *Child Care. Health and Development*. 12, 4, pp 257- 269

HULME, C. et al (1982) "Visual, Kinaesthetic and Cross Modal Judgements of Length by Normal and Clumsy Children". *Developmental Medicine and Child Neurology*. 24. pp 461-471

HUNT, J. (1960) "Experience and the Development of Motivation: Some Reinterpretations". *Child Development* 31. pp 489-50

JOHNSTON, C. (1994) "Unlocking the Will to Learn: Identifying a Student's Unique Learning Combination." Paper presented at the British Educational Research Association Conference. Oxford Sept. 8th.

KIRSHNER A. J. (1973) *Training that Makes Sense*. Academic Therapy publications.

KOSC, L. (1974) "Developmental Dyscalculia". *Journal of Learning Disabilities*. 7. 33. pp 46- 59

LASZLO, J . BAIRSTOW, P (1985) *Perceptual Motor Behavior. Developmental Assessment and Therapy*. London. Holt Ltd.

LOSSE, A. et al. (1991) "Clumsiness in Children--Do They Grow Out of It? A 10 Year Follow Up Study". *Developmental Medicine and Child Neurology* 33. pp 55-68

MAELAND, A. (1992) "Identification of Children with Motor Co-ordination Problems". *Adapted Physical Activity*. quarterly, 9, 4.

MAELAND, A. SOVIK N. (1993) "Children with Motor Co-ordination Problems and Learning Disabilities in Reading, Spelling, Writing, and Arithmetic". *European Journal of Special Needs Education*. Vol.8. No. 2 Pp 81 - 98

MISSIUNA, C. POLATAJKO, H. (1994) "Developmental Dyspraxia by Any Other Name: Are They All Just Clumsy Children", *The American Journal of Occupational Therapy* Vol.49 No. 7 pp 619-627

SEARS, C.J (1986) "Mathematics for the Learning Disabled Child in the Regular Classroom". *Arithmetic Teacher*. 1. pp. 3-11

SMITH ,F. (1988) "Writing, Collaboration or Competition" in *Writing and the Writer*. Heinemann books.

SOVIK N, MAELAND A (1986) "Children with Motor Problems (clumsy children)", *Scandinavian Journal of Educational Research* No 30. pp 39-53

STOTT, D.H. MOYES, F.A. HENDERSON, S.E. (1984) *Test of Motor Impairment*. Guelph, Ontario: Brook educational.

WILLOUGHBY, C. POLATAJKO, H (1993) "Motor Problems in Children with Developmental Co-ordination: Review of the Literature". *American Journal of Occupational Therapy* Vol 49 No.8 pp 787-793

WILLOUGHBY, C. POLATAJKO, H. WILSON, B. (1995) The Self-esteem and Motor Performance of Young Learning Disabled Children". *Physical and Occupational Therapy* Vol.14 (3/4) pp 1-30

WOOD, B (1991) "Suffering with Sums". *Special Children*. Sept 1991. pp 24-25

Return to the Let Me Learn Home page.