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**The Perceptual Preferences of a Group of Malaysian Kindergarten
Children and the Effects of Tactile and Kinaesthetic Teaching
Methods on their Learning of Bahasa Malaysia as a Second
Language.**

**A thesis presented in partial fulfilment of the requirements for the degree of
Master of Education at Massey University**

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1997

Abstract

This intervention study was undertaken in response to a teacher's desire to acquire more effective language teaching methods to use with a small class of academically able, but disinterested five to six year olds. It was decided to trial the use of tactile and kinaesthetic methods because learning style research literature indicates that these are the preferred perceptual modalities of children of this age and the existing language teaching programme consisted almost entirely of auditory and visual activities. Pre-intervention interviews confirmed the first hypothesis: that the children preferred tactile and kinaesthetic learning.

Pre- and post-testing of each lesson also confirmed the second hypothesis: that the class as a whole would achieve greater gains in vocabulary acquisition with the introduction of tactile and kinaesthetic learning activities. In a total of 18 out of 23 instances there was a significant pre-post gain on tactile lessons. In a total of 19 out of 24 instances there was a significant pre-post gain on kinaesthetic lessons.

However, the final two hypotheses positing an advantage of the tactile and kinaesthetic experimental lessons over control lessons were less strongly supported. Whilst the experimental lessons were slightly more effective than the controls, yielding three, and virtually four significant gains over the control lessons in six trials ($p = .0157$, $p = .0389$, $p = .0440$, $p = .0633$), the gains registered for matched conditions did not significantly exceed those for unmatched conditions. Reasons are argued to lie in a spread of effect from the experimental to the control lessons, and the need to consider the influence of other learning style elements.

Acknowledgements

I would like to thank my supervisors, Dr Alan Webster and Dr Joy Cullen for their patience, help and understanding of my learning style. I am also very grateful for the advice and assistance with the statistical analyses provided by Dr Ted Drawneek, Senior Consultant, Computing Services Centre, Massey University.

“Terima kasih”: to Mary for her eagerness to learn and to assist me with this project; to my former colleagues at the kindergarten for supporting me and tolerating the demands which I made on their time; to the kindergarten management for giving their blessing to this project; and of course to the children who welcomed me into their classroom, and willingly shared their knowledge and opinions with me.

Many thanks to Susan for helping to design and create the tactile teaching resources which were used in the intervention and her encouragement and assistance throughout this project.

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Chapter 1

Introduction

Perceptual preferences are just one of many aspects of learning style which may affect young children's ability to "concentrate on, process, and retain new and difficult information" (Dunn, Dunn & Perrin, 1994, p. 2). Some learners may be able to learn, no matter how information is presented, and others may have difficulty, regardless of the mode of presentation. However, perceptual preferences are a logical place to start a consideration of whether individual learning style affects learning because new information cannot be processed and retained unless it has been perceived. If learners have difficulty concentrating on information presented in a perceptual modality which they do not prefer to use, whether auditory, visual, tactile, or kinaesthetic, then that modality may prove to be an ineffective channel for teachers to try to use, if the goal of instruction is optimisation of individual learning. However, in order for teachers to be able to plan and conduct their lessons in a way that will accommodate individual perceptual preferences, they must first be able to identify the preferences of their students and have access to resources and techniques which enable them to present their lessons appropriately.

In the first instance, this study set out to determine whether it was possible to identify the perceptual preferences of a group of young Malaysian children through the use of self-report information. There are a number of instruments which claim to be able to assess perceptual preferences, but most were not designed for young children, or for non-native speakers of English. The reliability and validity of such instruments cannot be automatically assumed, even if an instrument is used which has previously been extensively trailed and validated with other groups of children, because of the difficulty of obtaining accurate and reliable information from young children (Rowe, 1991), and the possibility that the instruments might not be suitable for children of different cultural and linguistic backgrounds (Reid, 1987; Melton, 1990). The instrument which was chosen to assess the children's perceptual preferences, The

Learning Style Inventory: Primary (LSI:P) (Perrin, 1991) was designed and validated for young children, however, there is little information, either in the form of dissertations, or journal articles to show that it is a useful instrument for non-native speakers of English, or groups outside the United States. Therefore, it is of interest to see how useful such an instrument might be in a different setting, and to note the problems which might occur because of cultural and linguistic differences.

Furthermore, even if young children are able to report accurately which learning activities they prefer, these activities may not actually represent the ways in which they best learn because they may lack metacognitive knowledge of their own learning styles. Learning style theory and research has been challenged on the grounds that preferences are not necessarily the same as strengths, and a number of learning style instruments have proved to have little predictive validity under experimental conditions. Therefore, in the second instance, this study set out to determine whether the children's perceptual preferences, as measured by the Perceptual Preference Subscale of the LSI:P, could be used to predict their academic performance, when teaching methods were matched and unmatched with their expressed perceptual preferences.

A third area of interest, was the effect the learning style intervention might have on the children's attitudes towards the target language, and their beliefs about themselves as language learners. There is reason to believe that attitudes and beliefs play an important role in second language learning, through their influence on an "affective filter" (Krashen, 1987), or through their effects on the types of learning strategies a student might use. Children who have positive attitudes towards the target language and confidence in their ability to use it are more likely to want to engage in interaction with native speakers of the language and acquire the language more readily than students with less positive attitudes. Many teachers would agree that positive changes in students attitudes and beliefs is a worthwhile learning outcome, not only because such changes make the teaching/learning process more pleasant, but also more productive in the long term.

The intervention was conducted during Bahasa Malaysia classes partly for pragmatic reasons, but also because there is currently a great deal of interest in learning style within the language teaching community. There has been a lack of research conducted with non-native speakers of English within the mainstream of learning style literature. However, within the language teaching literature there has been active discussion and research into the concept of language learning style, (Oxford & Anderson, 1995) and the need for culturally valid learning style models and instruments (Reid, 1990). This literature can provide a conceptual basis for learning styles, which has often appeared to be lacking in the mainstream learning styles literature due to its focus on the effects of learning style, as opposed to its causes.

The problem

The immediate stimulus for the research was a teacher's concern over the performance and attitudes of her class of six-year-old Bahasa Malaysia as a Second Language learners and her desire to try new language teaching methods which might better enable her to meet the needs of the children. Learning style theory seemed to offer a way of identifying the needs of diverse learners, and providing guidance on means of meeting those needs within a classroom context. However, there is a lack of research evidence of the value of learning styles programmes at kindergarten level, comparatively little experimental learning styles research on non-native speakers of English, and seemingly no available information on the learning styles of young Malaysian children. Therefore, it was felt necessary to trial the LSI:P and monitor a limited learning style intervention with this group of children to establish whether they could be of benefit to the teacher and children concerned.

Data were gathered on the children's attitudes and beliefs about Bahasa Malaysia and their feelings about their Bahasa Malaysia learning experience over the course of the academic year, including before and after the intervention. This information was gathered by means of a questionnaire which is routinely administered to all language classes in the kindergarten. The children's learning style preferences, including preferences for perceptual modalities, were obtained just prior to the intervention using the LSI:P. The LSI:P is a structured interview which elicits forced choice answers in

response to pictures and set oral questions. During the seven week intervention period, the teacher taught one lesson each week using traditional auditory-visual methods, and one lesson using either tactile or kinaesthetic methods. Each lesson, the children were pre- and post-tested for recognition of the target vocabulary so that comparison could be made between vocabulary gains in matched and unmatched conditions. At the end of the intervention period, the children had a final examination on a sample of the vocabulary introduced during the intervention period to see the extent of long term vocabulary acquisition.

Theoretical framework

The investigation was conducted within the theoretical framework of the Dunn & Dunn (1990) learning style model. The model assumes that everyone has a learning style, which consists of a stable pattern of “biologically and developmentally imposed set of personal characteristics that make the same teaching method effective for some and ineffective for others” (Dunn, Beaudry & Klavas, 1989). The model currently identifies 21 variables from five basic categories: environmental, emotional, sociological, physiological, and psychological. The variable investigated in this thesis, perceptual preference, is classified by this model as a physiological preference. Perceptual preference refers to the modalities, auditory, visual, tactile and kinaesthetic, which an individual prefers to use to learn new or difficult information. Literature based on the Dunn & Dunn (1990) learning styles model often refers to “perceptual preferences” as “perceptual strengths” which implies an assumption that learners learn best through their preferred modalities.

The investigation was conducted during Bahasa Malaysia as a Second Language classes, and the pre-and post-tests were designed to measure language acquisition. The term “second language” is used when the target language is not a learner’s first or native language but it is one of the languages spoken in the country in which the learner lives, and the learner theoretically has access to native speakers of the language. The term “acquisition” is often used interchangeably with “learning” in language teaching literature, and reflects an assumption that language learning is a natural process that does not always require overt teaching. The term “acquisition” is

particularly appropriate when used in reference to second language contexts, and young children, since it is possible that the children will be exposed to appropriately simplified forms of the target language or “caretaker talk” (Lightbrown & Spada, 1993, p. 14) outside the classroom and have opportunities to acquire it in a natural context, in addition to the classroom context.

Why learning styles?

It is important to explain why it was decided to trial a learning styles approach to language teaching, rather than any other of a number of established language teaching methods.

The history of language teaching is littered with theories and teaching methods which have been enthusiastically adopted as “the one best way” and then replaced when they failed to live up to this expectation. A brief list of these methods, which are now seldom used, could include; the Grammar-Translation Method, the Direct Method, the Oral Approach, and Situational Language Teaching (Richards & Rogers, 1986). The Audiolingual Method, is another approach which was extremely influential for a time, and though still used by some teachers has been tried and abandoned by many others.

The model which is currently in most widespread use is Communicative Language Teaching. This model emphasises the importance of communicative proficiency, rather than the mere mastery of structures. It is often regarded as a method, because “Communicative” course books often have similar formats and activities. However, as Richards & Rogers (1986) point out, there is an unlimited range of exercise types and activities which are compatible with a communicative approach to language learning (p.76). Therefore, it is better considered an approach, rather than a method (p. 83).

There are a number of other methods, which are currently being practised and discussed. Some of these methods are more widespread or influential than others, but all are potential alternatives from which language teachers may choose. Alternative methods include; Total Physical Response, the Silent Way, Community Language Learning, the Natural Approach, Suggestopedia (Richards & Rogers, 1986),

Immersion (Harley, 1986), Co-operative or Collaborative Learning (Nunan, 1992), Experiential Learning (Kohonen, 1992), Computer Assisted Language Learning (Leach & Candlin, 1985), and Self-Instruction (Dickinson, 1987). Each of these methods has something of value to offer to learners and teachers, and in many cases some of the techniques employed by one method can be used in combination with techniques advocated by other methods.

Although language teachers potentially have a wide range of teaching methods from which they can select the “most suitable” for their students, there are many practical constraints which arise within particular teaching situations. For example, computer assisted learning requires the availability of expensive equipment which may only be able to be purchased at the cost of forgoing the purchase of other learning materials. Immersion requires commitment of a large proportion of classroom time, at the expense of other languages. Language teachers alone do not determine the budget priorities of their schools, or the educational, social and linguistic priorities of their communities. For these reasons, none of the “methods” listed above was considered as being an appropriate model for change in the language teaching programme in the kindergarten. However, the proposed learning style-based intervention could be argued to be within the framework of Communicative Language Teaching.

A further consideration in the selection of teaching methods was compatibility with the instructional methods used in other areas of the curriculum. English instruction within the kindergarten was based on a New Zealand “Whole Language” approach and involved contextualised and developmentally appropriate activities. The syllabus and methods adopted by the existing Bahasa Malaysia programme did not take these factors into consideration. The consultant and language teachers considered it desirable that any new programme or methods should be more child-friendly than the existing language teaching programme. Learning styles offered this possibility.

Another reason for not adopting a single recognised language teaching method as the basis for the intervention was that although each of these methods is useful for specific purposes, and for particular groups of learners, no single method has been shown to be better for everyone (Brumfit, 1984). It is not difficult to identify characteristics of each

method which would make it useful for particular subgroups of learners, and highly uncongenial for other subgroups of learners. Total Physical Response, for example, involves the co-ordination of speech and action and attempts to teach language through physical action (Richards & Rodgers, 1986, p. 87). This type of learning activity is likely to be most congenial to kinaesthetic learners, but not to learners who prefer to sit in their seats during language lessons. Co-operative or collaborative learning is congenial to students who like to work in pairs or small groups, but many students prefer to work alone. The audio-visual approach is suitable for highly auditory learners, but in some forms disadvantages those visual learners who require words rather than pictures. Suggestopaedia is compatible with a preference for a high degree of structure and the need for an authority figure present. It also involves the use of background music (Richards & Rodgers, 1986, p. 145). While some students do have a preference for these factors, many other students have opposite preferences.

The search for “one best language teaching method which will work for everyone” has been fruitless because each learner is an individual, with individual abilities, preferences, and needs. This tenet is central to the Dunn & Dunn Learning Style Model. Recognition of individual differences and needs, and enhancement of individual learning also held an important place in the kindergarten’s mission statement. It was decided to trial a learning styles approach to language teaching because such an approach emphasises identification, acceptance and responsiveness to individual needs, while retaining the ability to encompass established language teaching methods.

Chapter 2

Literature Review

Learning Styles: Definitions, models and instruments

Definitions

One of the greatest difficulties involved in conducting a review of “learning style” literature is the number and variety of theories, models and instruments which are subsumed under the general category “learning style”. Any definition of learning style, which could claim to cover the range of uses the term has been put to would have to be so general that it would be functionally useless. One such broad definition could be “Learning style is something to do with the way people learn”. De Bello (1990), in a comparison of eleven major learning style models, notes that “there are nearly as many definitions of learning styles as there are theorists” (p. 203). However, there have been attempts to create definitions which are specific enough to have meaning, yet inclusive of a range of factors. One such definition, created by the National Association of Secondary School Principals Learning Styles Task Force, is as follows, “Learning styles are the characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment” (Keefe & Monk 1986, cited in DeBello, 1990, p. 203). An alternative definition, which is a little more “user-friendly”, is provided by Dunn et al. (1994), “Learning style, then, is the way each learner begins to concentrate on, process and retain new and difficult information” (p. 2).

Models

Learning style models range in scope and complexity from those which deal with only one factor, for example field-independence vs field dependence (Witkin, Oltman, Raskin, & Karp, 1971), or perceptual preferences (Reinhert, 1976); to those which deal with several factors, such as perceptual preference and personality (Oxford, 1989); and others which include a wide range of factors (Letteri, 1980, Dunn & Dunn,

1993). A model which considers only one factor may seem economical and easy to apply but also may have little practical use unless that factor is the one and only component of learning style. The belief that only one aspect of style impacts on individual learning is analogous to the belief that only one of the ingredients is important in a recipe for baking a cake. A range of variables contribute to style, some more important for particular individuals than others, and any single variable is part of a wider pattern of preferences (Dunn et al., 1994). Multi-factor models can be further re-categorised into those based on personality variables, such as the Myers Briggs Type Indicator (Myers & Briggs, 1976) from which learning styles can be deduced, or empirically discovered, and instructional processes models such as the Dunn & Dunn Learning Style Model (1990) which are empirical by origin.

Instruments

The wide range of learning style definitions and models has resulted in a correspondingly large number of instruments which purport to measure single or multiple learning style variables. One review of literature on learning and culturally diverse students noted the existence of more than 30 learning styles instruments (Irvine & York, 1996). There may be many other instruments in circulation, created by teachers or other individuals for their own use and then shared with others. These instruments can sometimes be found in books and journal articles written for teachers (e.g. Davis, Nur, & Ruru, 1994; Ward & Daley, 1993). While these instruments may have provided useful information for the practitioners who created them, there are likely to be a number of problems for subsequent users because reliability and validity information are seldom available and the context which the instrument was originally created for may be very different from those in which it is subsequently used.

Unfortunately, problems of reliability, validity and contextual or cultural appropriateness are not limited to anonymous "home-made" instruments. Serious challenges have been made to the reliability and validity of a number of widely used learning style instruments (Bonham, 1988; DeBello, 1990; Irvine & York, 1995). In a discussion of four learning style instruments; the Embedded Figures Test, Hill Cognitive Style Inventory, Kolb Learning Style Inventory, and Canfield Learning Style Inventory, Bonham noted that no instrument was above criticism. De Bello's

evaluation of the variables, appropriate populations, validity and research background of eleven major learning style models, noted that some of the instruments, for example the Edmonds Learning Style Identification Exercise (ELSIE) (Reinhert, 1976), demonstrated little validity or reliability, while others such as the Kolb Learning Style Inventory (1976) had either reliability or validity but not both. Attempts to replicate studies or validate existing instruments have often resulted in researchers concluding that the instruments concerned do not actually measure what they claim to measure (Corbett & Flint Smith, 1984). For example, one attempt to validate ELSIE, an instrument which claims to measure perceptual preferences through asking respondents what physical sensations they experience when they hear a word, concluded that ELSIE probably did not measure what it purports to describe, and that its test-retest reliability is marginal (Corbett & Flint Smith, 1984). The Embedded Figures Test (Witkin et al., 1971) has also been criticised on the grounds that its relationship to the construct of field independence/dependence is problematic (Bonham, 1988).

Even instruments, such as the Dunn et al (1978) Learning Style Inventory, Learning Style Inventory: Primary (Perrin, 1991), and the Productivity Environmental Preference Survey (Dunn, Dunn, & Price, 1991) which have been extensively trialed and validated, and which report strong reliability, are not immune to criticism. For example, Curry (1990) found that out of thirteen research studies based on the Dunn and Dunn model which she examined, four failed to show any effect attributable to learning style. In response to this, and other criticisms, a meta-analytic validation of the Dunn & Dunn model of learning style preferences was recently conducted by Dunn, Griggs, Olson, Beasley and Gormon (1995), to re-assert the validity of the model and its instruments through the meta-analysis of 36 research studies. The authors cautioned against the practice of conducting meta-analyses of studies which have used widely differing models, instruments, and forms of statistical analysis.

One of the strongest challenges to the validity of learning styles instruments, including those based on widely researched models, such as the Dunn and Dunn model, is that they were created and trialed with native speakers of English, primarily in the United States of America, and that their validity and reliability cannot necessarily be assumed

in any other culture or context (Eliason, 1995, p. 21). There is a great deal of interest in the concept of learning style within the language teaching community (Reid, 1995) and in recent years a number of learning style instruments have been developed which have recognised and sought to address the special needs of linguistically and culturally diverse language learners. Often these instruments have been designed with the needs of teachers and learners in mind, rather than those of researchers. The Style Orientation Scale for Language Learning (SOS-L) (Oxford, 1991), contains five scales designed to indicate; sensory preferences (visual, auditory or hands-on); relations to others; (extraversion or introversion); relations with ideas (intuitive or concrete-sequential), orientation to learning tasks (closure or openness); and overall orientation (global or analytic). It aims to provide learners with knowledge about their general approaches to learning a new language and overall preferences in language learning, and gives advice on how this self- knowledge can enhance individual language learning. An extended version of this instrument, the Style Analysis Survey (SAS) (Oxford, 1993) is designed to assess learners' general approach to learning and working.

Other instruments designed for language teaching contexts have also tended to focus on only a few learning style variables, particularly on sensory or perceptual preferences. The Perceptual Learning Style Questionnaire (Reid, 1984) measures strength of perceptual preferences and preference for group or individual learning. The Perceptual Learning Preferences Survey (Kinsella, 1993), deals only with perceptual preferences. Unfortunately, Oxford, Reid and Kinsella all have different classification schemes for perceptual preferences. Oxford classifies the preferences as visual, auditory and hands-on, Reid classifies them as visual, auditory, kinaesthetic and tactile, and Kinsella classifies them as visual/verbal, visual/non-verbal, auditory, and visual/tactile kinaesthetic.

It cannot automatically be assumed that an instrument designed for non-native speakers is more appropriate for a particular group of culturally diverse learners than those designed for native speakers of English. Just as instruments designed for native speakers may not be appropriate for non-native speakers (Reid, 1987), similarly instruments designed for one group of non-native speakers may not be suitable for

non-native speakers of a different cultural background. Even groups with the same ethnic background, but different countries of origin may respond in different ways (Melton, 1990).

A further difficulty in the search for appropriate learning style instruments is a lack of instruments designed specifically for young children. Instruments designed for older learners may refer to learning activities with which younger children have no experience, e.g. using graphs and charts (Kinsella, 1994); contain difficult ideas, structures, or vocabulary, e.g. "Messy, unorganized environments make me nervous." (Oxford, 1993, Activity 4, item 5); or contain instructions that are difficult for young children to follow, e.g. "For each item circle the response that represents your approach." (Oxford, 1993). These instruments have been found to be appropriately worded, valid and reliable, for older second language learners, based on research conducted with adolescent or adult populations (Kinsella, 1996, personal communication). They would, however, require extensive adaptation before they could be used with younger learners.

The Learning Style Inventory: Primary (Perrin, 1991), is based on the Learning Style Inventory but has been designed for use with young children. It uses language which is readily understood by young children and refers to activities which are commonly experienced in kindergarten and junior primary classes, such as playing with puzzles or listening to a story. The LSI:P uses simple ideas, structures and vocabulary, and does not require respondents to read or write or understand complicated instructions. Further information about the form, content, and administration of the LSI:P, and its reliability and validity may be found in **Chapter 3** below.

Although the LSI (P) was specifically designed for young children, it is not immune to problems inherent in the use of self-report data. The reliability and validity of this type of information are dependent on the extent of metacognitive awareness of each respondent (Rowe, 1991). Young children in particular may not be capable of giving accurate and complete accounts of their preferences. Furthermore, since the LSI:P is presented in a face-to-face interview, the authenticity of responses may be affected by unintentional verbal and non-verbal cues from the interviewer (Rowe, 1991). Other

potential problems with the use of learning style instruments which rely on self-report information include: the possibility that children with some types of style may be more likely to respond consistently than children with different characteristics; and the potential existence of various kinds of response set (Bonham, 1988).

The broad range of theories, models and instruments which fall in to the “learning styles” category makes it difficult to summarise or evaluate the area as a whole. The variation in: definitions; scope of the models; and reliability and validity of instrumentation, precludes any easy generalisation about the utility of the concept of learning styles.

Learning Styles Research

Introduction

A great deal of research can be included in the generic category of “learning style” research. This research, however, has been based on a large number of models and instruments. Many of these have little in common, other than the general “learning style” title. Meta-analyses of learning style research, such as those conducted by Curry (1990) and Kavale & Forness (1987) have been criticised on the grounds that they combine research based on widely differing models, definitions and instruments. This practice may lead to the dilution or negation of positive findings because of the inclusion of research based on instruments with little reliability or validity (Dunn, Griggs, Olson, Beasley & Gorman, 1995). In other words, not all learning style research is of equal quality, and an overview of all learning style research requires so broad a perspective that important details are obscured. Fortunately, there are a number of ways this information can be sorted and narrowed down, in order to be more easily evaluated.

Learning style research can be sorted according to the model or instrument used, e.g Edmonds Learning Style Identification Exercise (Reinhert, 1976); Kolb Learning Style Inventory (Kolb, 1976); Dunn & Dunn Learning Styles model and related inventories (Dunn et al, 1978; Dunn et al., 1991; Perrin, 1991). This enables detailed examination of the research basis for a particular model or instrument but limits the amount of information related to individual learning style factors, since research into some factors, such as perceptual preference is dispersed over a wide of range models and instruments.

Another way of sorting the learning style research is according to the learning style element it deals with, for example perceptual preferences, field dependence, personality dimensions, environmental factors, and so on. This approach provides a lot more information about individual elements, but problems may arise due to differences in the way some factors are defined and measured. For example, perceptual preferences have commonly been classified into three (Carbo, 1980) or four (Dunn et al., 1994) categories but other schemes have been used, including one which contains seven separate categories of perceptual preference (James & Galbraith, 1985). A particular

area of difficulty in comparing research related to perceptual preferences, is that some instruments combine tactile and kinaesthetic preferences into one category. This single category is sometimes referred to as “haptic” (O’Brien, 1990) and sometimes as “hands on” (Oxford, 1993).

A third way of looking at learning style research is according to characteristics of the learners involved, such as age, ethnic origin, or special needs. This approach combines the disadvantages of the approaches previously mentioned, but does bring into focus the preferences and needs of specific groups of learners.

It is also often possible to group learning style research according to areas of the curriculum, especially when the research has involved intervention studies. This approach raises the question of whether some elements of learning style are of differing importance in different areas of the curriculum. In the area of language learning, for example, instruments have been developed to measure language learning style, and the items included are particularly relevant to language learning strategies and activities (O’Brien, 1990; Kinsella, 1993; Oxford, 1993). Learning style instruments designed for language learners have focused mainly on either perceptual preferences alone (Kinsella, 1993; O’Brien, 1990), or in combination with sociological preferences (Reid, 1984) or personality dimensions (Oxford, 1993). Learning style research in the field of language learning has correspondingly been mainly concerned with these three aspects of learning style.

Research related to specific models and instruments

Although there are at least 30 documented learning style instruments (Irvine & Yorke, 1996), only a few have been extensively researched (De Bello, 1990). In some cases, this may be because the instruments are relatively new (e.g. Kinsella, 1994). In other cases, the instruments are not research-oriented but designed to provide information useful to learners and practitioners (e.g. Kinsella & Sherak, 1993). Some instruments have been used in research studies, with no evidence of reliability or validity (e.g. Davis et al, 1994), and in other cases instruments have been used for a time and then fallen into disuse when subsequent research has found them to have insufficient reliability or validity for research purposes, e.g. ELSIE (Reinhert, 1976).

Unfortunately the last category of instruments mentioned above, those which have been used for a time, then discarded because they have proven to be of limited value, has provided the basis for a considerable proportion of learning style research. This research, while of interest at the time it was conducted, cannot provide a sound basis for an evaluation of the value and relevance of the concept of learning style, or of any other learning style model. Furthermore, while it is appropriate to discount the findings of research studies based on models and instruments which have subsequently been found to be inaccurate, inappropriate, or lacking validity and reliability, this does not justify assuming that the learning style factors which the research attempted to examine are not real or significant. In other words, there is no need to throw out the baby with the bath water.

Field dependence/independence is an example of a learning style factor which for some time was extensively researched using an instrument of questionable construct validity. It is important to evaluate this particular test more extensively for two reasons. Firstly, that as a well-known psychological test it attracts attention and possibly some assumption that as a more "pure" measure, it will measure the construct of interest (in this case learning style) more rigorously. Secondly, because it is easy to assume that its validity in regard to the construct it is designed to measure will transfer directly to a different application. The Embedded Figures Test (EFT) and a group version (GEFT) (Oltman, Raskin & Witman, cited in Bonham, 1988) were designed to measure the ability to find simple geometric figures within complex drawings (Bonham, 1988). While this test may be perfectly suitable for measuring a particular type of spatial awareness, this does not necessarily mean that it can predict performance on tasks in other domains which require the learner to be able to perceive individual parts as separate from the whole, for example performance of a language learner on a cloze test.

In reviewing research on field dependence/field independence from the late 1970's to the mid 1980's, Irvine & York (1995) found that, on the whole, embedded figures test performance failed to predict performance in specific subject areas and had less predictive validity than intelligence tests. Bonham (1988) lists the following

weaknesses of the EFT; it measures the *ability* to do something rather than the way it is done (*style*); it measures only field independence and merely infers field dependence from lack of field independence; there is no way to tell if a person is good at both approaches or even whether the two traits are true opposites; speed is an important factor on the EFT but it is not necessarily an important factor in field dependence/independence; the task may be sex-biased, since women generally do not do as well on tests of spatial ability and consequently are generally found to be less field independent than men. Chapelle (1995), in assessing the relevance of the concept of field dependence/independence for language teaching, argues that the concept itself is valid but embedded figures tests do not provide an appropriate means of measuring it.

Unfortunately the problem with field dependence/independence is not only that the instruments used to measure field/dependence were unsuitable for the task, but also that some definitions of the construct seem to suggest that field independence is a superior quality to field dependence. For example, Irvine & York (1995) write that “field dependent behaviours include high levels of impulsivity, low reflectivity, and reliance on the social environment and authority figures” while “field independent behaviours are more conceptual and analytic in nature. Field independent persons tend to be autonomous, detached, goal oriented and self aware” (p. 487). This definition confounds several distinct learning style factors but it also reflects the tendency of definitions of field dependence/independence to suggest the superiority of field independent characteristics, despite the basic learning style tenet that no style is inherently better than any other. This is especially unfortunate, given the frequent association of field dependence with women, and minority ethnic groups.

Despite its unfortunate history, the concept of field dependence/independence is still seen as an important aspect of learning style, especially in the field of second language learning where the term “field sensitivity” is used in preference to “field dependence” to avoid the negative connotations of the term “dependent” (Ramirez & Castenada, 1974, cited in Kinsella, 1995, p. 180). Field sensitivity refers to the tendency to attend to the whole visual field, or situation, rather than its parts (Kinsella, 1995). Field sensitive people are likely to be more sensitive to social context in language learning

and be regarded as outgoing and considerate. They also perform well with less structure in their learning (Oxford, 1995). Field independent learners tend to perceive elements independently of a context or field (Kinsella, 1995). Field independent learners are more likely to be able to find it easy to separate details from an ambiguous context through the use of analysis (Oxford, 1995).

Once the problem of pejorative connotations is removed, and the concepts are related to the specifics of language learning, it is possible to see how skills related to field sensitivity could be useful in some learning situations, for example social contacts with native speakers of the target language, while field independent-type skills could be more useful in other situations, for example formal grammar lessons. As Chapelle (1995) points out, learners at both ends of the field dependence continuum can be successful language learners, given appropriate language learning situations and activities (pp. 159-160). It is also clear that field sensitivity and field independence are not mutually exclusive and that most learners fall somewhere along a continuum between the two and are actually capable of utilising both styles, to some extent (Kinsella, 1995). Furthermore, it is possible to identify aspects of different cultures which reward (or discourage) field sensitive or field dependent behaviour and to recognise the importance of culture in the development of learning style and the need to honour these style differences.

Unfortunately, because “learning style” is a generic term, problems with some elements and the way in which they have been researched (for example field independence /dependence) have resulted in some critics calling into question the value of the concept of learning styles and dismissing all learning styles research. However, as the example of field independence/field sensitivity shows, it is possible to revise constructs to make them more appropriate. Furthermore, it is also possible to find models with substantial research traditions and instruments with established reliability and validity.

Research related to the Dunn & Dunn learning style model

The Dunn & Dunn model is a multidimensional model which consists of twenty one subcategories, or elements, divided into five groups of stimuli, environmental,

emotional, sociological, physiological and psychological. Following the development of this model, a number of related instruments have been developed to assess learning style. These are the Learning Style Inventory (LSI) (Dunn, Dunn & Price, 1989), suitable for learners aged approximately nine to eighteen with two grade ranges; the Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn & Price, 1990) for adults; and the Learning Style Inventory (Primary Version) (LSI:P) (Perrin, 1981) which is an adaptation of the LSI for young non-readers and suitable for learners aged five to eight. The development of these three instruments, has enabled research based on the Dunn & Dunn learning style model to be conducted across a very wide range of ages. The close relationship between the instruments enables closer comparison of results than would be possible with instruments designed for different models. All of the research studies cited below were based on the Dunn & Dunn model, and used either the LSI, LSI:P or the PEPS, unless otherwise mentioned. The Dunn & Dunn model has been used in a wide range of schools, and generated research in more than one hundred institutions of higher learning (Dunn et al., 1995) and in a number of different countries (Milgram, Dunn, & Price, 1993). The majority of this research however, has been conducted by doctoral candidates within the United States, working with older children, adolescents or adults. It has also focused mainly on a few learning style elements, such as perceptual preferences, and preferences for environmental factors. Many of the research studies mentioned below are doctoral dissertations and due to the difficulty in obtaining access to foreign dissertations, I have only referred to them as abstracts, and cited them according to their Dissertation Abstracts International references. Within this chapter, these abstracts have not been distinguished from other texts and therefore the reader should refer to the bibliography to check the sources of each reference.

Research related to individual learning style elements

a) Discussion of the range of elements involved in learning styles research

The Dunn & Dunn Learning Style Model, which began with twelve variables in 1972, currently encompasses twenty-one elements which are clustered into environmental, emotional, sociological, physiological, and psychological categories. While learning styles research has included each of these categories, certain categories and particular elements have received more attention than others. This has probably been due to two

factors. Firstly, some elements are more important for particular subgroups of the student population than others. This does not mean that the other elements are not important at all, but just that teachers and researchers usually choose to deal with elements which have the biggest impact on the particular group of students they are involved with.

The other reason is that some variables are more easily controlled and manipulated than others. For example, it is easy to turn a light on and off while keeping other variables constant. It is much more difficult, in natural settings, to isolate some elements from each other. Group work, for example, is often noisier than working alone. Lessons conducted at different times of the day may also involve changes in temperature. While it may be theoretically possible to isolate individual elements and control all the others, practical classroom details like availability of space, resources and manpower may make it extremely difficult to do so.

The majority of research within the Dunn and Dunn tradition appears to have involved elements within the sociological, environmental and physiological categories. It is outside the scope of this study to review research related to each element or category. However, a meta-analysis of experimental studies based on the Dunn and Dunn Learning Styles Model, which included studies involving the whole model, as well as those involving elements from the emotional, sociological, environmental and physiological categories, determined that there had been an overall effect, in favour of improved performance when instructional methods were matched with individual learning style preferences (Dunn et al., 1995).

b) Research related to perceptual preferences

Perceptual preference has been one of the most extensively researched learning style elements. Research studies have included groups at kindergarten (Carbo, 1980; Harp, 1990/1991), primary (Coleman, 1988/1989; French, 1991; Wheeler, 1983/1984), elementary (Hill, 1987/1988; Turner, 1992; Weinberg, 1983), intermediate (Braio, 1995/1996), high school (Bauer, 1991, cited in Dunn, Dunn & Perrin, 1994, p. 18; Garrett, 1992, cited in Dunn et al., 1994, p.18; Kroon, 1985/1986; Martini, 1986/1987), tertiary (McFarlane, 1989) and adult levels (Buell & Buell, 1987, cited in

Dunn et al, 1994, p.18; Ingham, 1989/1990). Most of the studies mentioned above have been experimental, and all have looked either at relationships between perceptual preferences and achievement when instructional methods are matched with learning styles, or at relationships between perceptual preferences and attitudes to learning activities.

These studies have generally found that performance has improved when methods of instruction have been matched with individual perceptual preferences. For example, Ingham's (1989/1990) study involving corporate employees demonstrated that both training achievement and attitudes towards company-sponsored training programmes were significantly improved when individual employees' perceptual preferences were accommodated. At the high school level, Kroon (1985/1986) found that the achievement of a group of ninth and tenth grade students was significantly greater when instruction was not only introduced through each students' first preference, but also reinforced through a secondary or tertiary preference. At the elementary level, Hill's (1987/1988) study found a significant interaction between modality preferences and instructional method for a group of upper-elementary level learning disabled students. Wheeler (1983/1984) obtained similar results with second grade learning disabled students. At the kindergarten level, Carbo (1980) found that children who were identified as auditory, visual or "other" (tactile and kinaesthetic) learners performed significantly better on word recognition tests when they had been taught using methods which matched their perceptual preferences.

However, there is evidence that matching perceptual preferences alone, without considering other learning style elements, does not necessarily result in increased achievement for all individuals. In a comparative study of the effects of learning style prescriptions and/or modality-based instruction on the spelling achievement of a group of fifth-grade students, Turner (1992) found that modality-based instruction alone did not significantly increase spelling achievement. However, students who, in addition to receiving modality-based instruction, were provided with information about their whole learning style profile and suggestions for applying it independently, showed significant gains in spelling achievement.

This effect was taken into account in Braio's (1995/1996) study, which involved incrementally introducing a number of learning styles strategies. Special education and low-achieving students from the fourth, fifth and sixth grades were incrementally matched according to their individual preferences for sound, light, temperature, design, mobility, tactual, kinaesthetic, auditory and visual elements. Their performance was compared with a control group which consisted of children who either had no preferences, or whose preferences were unmatched. Both special education and general education students whose preferences were matched showed superior achievement over students in unmatched conditions. The general education students also showed improved attitudes towards reading after the learning styles-based instruction.

It is clear that learning style encompasses more than just perceptual preferences (Dunn et al, 1994, p. 2), and one should not expect that matching a single element will have significant effects for all individuals, since any other the other 20 elements may be equally or more important for individual students. However, there may be another reason why it is difficult to find differential effects of instructional methods when working with young children. Studies which have examined the perceptual preferences of non-learning disabled young children have found that the majority of young children express tactile and kinaesthetic first preferences (Dunn et al, 1994, p. 16). Since a developmental order in perceptual preferences has been noted, i.e. kinaesthetic, tactile, visual, and finally auditory (Dunn, 1991, p. 6), it would not be surprising if most young children were capable of learning using tactile and kinaesthetic methods. In fact, this effect was noted by Barnes (1991) in a study involving a group of first-graders. The children did not show a significant difference in reading vocabulary achievement when taught in their perceptual preferences, but did show higher achievement scores when taught by tactual/kinaesthetic instructional methods.

Research related to specific learner characteristics

a) Age

i) *Overview*

One of the strengths of the Dunn and Dunn Learning Styles Model, is that it is capable of encompassing all age groups. The development of a series of instruments, appropriate for individuals of different ages has enabled learning styles research based on the Dunn & Dunn model to span a wide age range. Literally hundreds of studies have been carried out using the PEPS and the LSI and it is beyond the scope of this study to review them all. A meta-analytic validation of the Dunn and Dunn model of learning style preferences, which examined thirty-six studies spanning primary, elementary, secondary, tertiary and corporate levels, showed an overall effect in favour of improved performance when instructional methods were matched with individual learning style preferences (Dunn et al., 1995).

ii) *Age related learning style differences*

There has been a noticeable lack of longitudinal research conducted with individuals to ascertain whether there are consistent developmental changes in learning styles. However, age related changes have been inferred from differences in patterns of group preferences from a large number of studies. In other words, the “typical” pattern of preferences of each age group differs in a number of ways from those of other age groups. It also appears that preferences for some elements are relatively stable over time, whilst others show evidence of developmental trends.

Changes in preference for processing style have been noted as children move from elementary to higher levels of schooling. Dunn & Dunn (1993) note that “the majority of elementary school children are global, but the older the children are and the longer they remain in school, the more analytic some of them become” (p. 7). Young children tend to prefer less light but older children and adults seem to progressively require more light (Dunn et al., 1990, p. 52). Preference for sound appears to remain stable throughout the elementary years but increases during adolescence before returning to its previous level (Dunn, et al., 1990, p. 52). Sociological preferences also seem to undergo changes during adolescence. Price (1980) noted that students at higher grades were less teacher motivated than younger students (cited in Dunn et al, 1990, p. 53).

Whilst it has been noticed that most students do not prefer to learn in the early morning, high school students have been more likely to report preferences for early morning than have elementary school children (Dunn, et al., 1990, p. 55).

Perceptual preference is another element for which there is evidence of developmental change. A number of research studies have shown that young children are more likely to have kinaesthetic and tactile perceptual preferences than auditory or visual preferences (Crino, 1984; LeClair, 1986; Keefe, 1982; Price, 1980, cited in Dunn et al., 1994, p. 17). Preference for visual and auditory modalities appears to increase with age since groups of older children and adults have shown a tendency to prefer these modalities more than young children do so. Dunn (1991) has noted a “normal” perceptual development continuum of kinaesthetic, tactual, visual and finally auditory (p. 6).

iii) *Research related to young children*

Although the Dunn & Dunn learning style model has been widely researched, most of this research has been conducted with older children, adolescents and adults. This has not been because young children do not have learning styles, or because their styles are not important. Rather, it is probably due to the fact that it is difficult to obtain reliable self-report data from young children and extremely difficult to conduct controlled experiments with them in natural settings. The Learning Style Inventory: Primary (Perrin, 1991) provides a means of solving the problem of obtaining self-report data, but its administration requires a great deal of time, patience and skill.

Early studies involving young children which are mentioned in the Dunn & Dunn learning styles literature, e.g. Urbschat (1977) (cited in Dunn, 1991, p. 4), Carbo (1980), and Wheeler (1983/1984), did not use the LSI:P but instead used the LSI or other tests to measure learning styles. These studies established that young children had identifiable learning style preferences, and that their performance was improved when instructional methods were matched to their learning style preferences.

Carbo (1980) classified the perceptual preferences of a group of kindergarten children according to strength of visual and auditory preferences and investigated the effects of

three word stimulus treatments on their subsequent recall of sight-word vocabulary. She found a significant interactive effect between modality preference and word stimulus method on recall scores. Wheeler (1983/1984) classified the perceptual strengths of a group of learning disabled, second grade students according to whether they had auditory strengths, visual strengths, or neither auditory nor visual strengths. The students were then instructed and tested through three different sensory instructional approaches. It was found that no single method was most effective for all students but that there was a significant interaction between the students' perceptual strengths and the instructional methods.

Following the development of the LSI:P, a number of descriptive studies confirmed its usefulness in identifying young children's learning style preferences at kindergarten (Crino, 1984; Harp, 1990/1991) and junior primary school (Coleman, 1988; Moss, 1982) levels. These studies all concluded that children could identify their own learning style preferences.

In addition to description of young children's learning styles, some studies have sought to examine their relationship to other educational factors. Spires (1983) found that providing teacher in-service training about learning styles to teachers of students in kindergarten through grade eight significantly improved their students' performance in reading and mathematics. Crino (1984) observed and analysed the learning styles of a group of kindergarten children. She found that the existing curriculum in the kindergarten did not accommodate the children's learning styles. She also concluded that the analysis of learning style patterns in the study agreed with most of Perrin's research. Coleman (1988) identified differences in physical and emotional learning style preferences of two groups of gifted and non-gifted first grade students. Harp (1990/1991) determined that there was a relationship between the ability of a group of kindergarten children to conduct successful word analysis and individual learning styles.

While there has been extensive research with older students which has sought to demonstrate the value of matching instructional methods with learning style

preferences, fewer experimental studies have been conducted with young children. However, Perrin (1991) cites several studies which have used the LSI:P to identify learning style preference and then investigated the effects of matched and mismatched methods of instruction. Miller (1985) found that second grade students who indicated that they preferred mobility performed better on a reading test when they were permitted to move around than when they were required to keep still (cited in Perrin, 1991, p. 4). Damian (1988) found that a group of third graders performed better in social studies when their sociological preferences were accommodated (cited in Perrin, 1991, p. 5). Fox (1989) found that a group of first graders performed better on mathematics when their motivational sources and perceptual preferences were accommodated (cited in Perrin, 1991, p. 5). Perrin (1984) found that a group of first grade gifted and non-gifted children improved in both performance and attitude when they were taught problem solving and word recognition through strategies which matched their sociological preferences. Wheeler (1983/1984) found matching instructional methods with perceptual preferences had a significant effect on the word recognition scores of a group of learning disabled second grade students.

Not all studies have found significant differences in the performance of young children when their learning styles are accommodated by methods of instruction. French (1991) found that a group of first grade students did not show significant differences in achievement when their perceptual preferences were matched. However, the children did show significant improvements in performance when taught by tactual/kinaesthetic methods.

b) Culture and Ethnicity

The Dunn & Dunn learning style model originated in the United States of America, and most research related to the model has been conducted within that country. However, there is a growing body of learning styles research which has been conducted outside the United States, including in Asia (Milgram, Dunn & Price, 1993). Learning styles research within the United States has also been conducted with students from a wide range of cultures and ethnic groups (Dunn & Griggs, 1995).

Research conducted with minority ethnic groups within the United States, has mainly involved African-American, Mexican-American, and Asian-American students (e.g. Jalali, 1988; Williams, 1989/1990; Yong, 1991/1992) and Native-American students (e.g. Weaver, 1992/ 1993). However sometimes other groups have been included, for example, students of Greek heritage (Jalali, 1988). On the whole, these research studies have involved either the description of the learning style characteristics of students of a single ethnic group(Weaver, 1992/1993; Williams, 1989/1990) or the description and comparison of the learning style preferences of several groups (Jalali, 1988; Stokes, 1989; Yong, 1991/1992). These studies have all concluded that it is possible to use the LSI to identify differences in the patterns of learning style preferences between groups of students of different ethnic and cultural backgrounds. However, as Williams (1989/1990) points out the learning styles of individuals within the groups are not identical.

Research conducted with groups of students outside the United States has included groups in Singapore (Lam-Phoon, 1986/1987), the Philippines (Ingham & Price, 1993, Wallace, 1995), Israel (Milgram & Price, 1993), Guatemala (Sinatra, de Mendez & Price, 1993), Korea (Suh & Price, 1993), Canada (Brodhead & Price, 1993), Brazil (Wechsler, 1993), Egypt (Soliman, 1993), and Greece (Spiridakis, 1993). This research has consisted mainly of either the description of the learning style characteristics of students from a single ethnic group or nationality (Soliman, 1993; Wallace, 1995; Wechsler, 1993) or the description and comparison of the learning style preferences of a group of non-American students with American students (Brodhead & Price, 1993; Ingham & Price, 1993; Lam-Phoon, 1986/ 1987; Milgram & Price, 1993; Sinatra, de Mendez & Price, 1993; Spiridakis, 1993; Suh & Price, 1993).

These studies have concluded that the LSI and the PEPS are capable of being used to identify the learning style preferences of these groups of students. They have also identified distinctive features of the patterns of preference of these students which differ from those of American- Caucasian students. For example, Milgram & Price (1993) found that Israeli adolescents were more likely than their American peers to want to work alone and also had a lower preference for structure. However, they

preferred a quieter, more formal learning environment and had a lower need for mobility. They also expressed lower tactile and kinaesthetic preferences. Ingham & Price (1993) found that their Filipino sample preferred a cooler, quieter, more brightly lit learning environment than their American peers. They had a stronger preference for learning in the morning. They were more teacher motivated and preferred to learn in a variety of ways, and with authority figures. They also preferred more structure, were more persistent and were more motivated.

The studies conducted with students from a range of ethnic groups, both within and outside the United States have identified distinctive patterns of learning style preferences which differ from those expressed by Caucasian-American students. However, there are a number of reasons why extreme caution should be exercised in generalising from these students to other members of the same ethnic group. Firstly, most of the studies have been conducted within a single school (Milgram & Price, 1993; Ingham & Price, 1993), or a small number of schools (Wallace, 1995). These schools, and their students, may differ considerably from other schools in the same country. On the other hand, comparison is usually made with American information drawn from a very large database.

A second reason for exercising caution when generalising information from one group of students to other groups or individuals, is that the studies have also found considerable differences in learning style between members of a single group. In discussing the connection between learning style and culture, Guild (1994) notes that "Cultures do have distinctive style patterns, but the great variation among individuals within groups means that educators must use diverse teaching strategies with all students" (p. 16) and that "Generalisations about a group of people often lead to naive inferences about individual members of that group"(p. 17). Researchers within the Dunn & Dunn learning style tradition have also noted that significant differences in learning style preferences have been found within ethnic groups between individuals belonging to the same classroom or family (Dunn & Griggs, 1995, p. 37). Culture has an influence on learning style but it is only one of a number of factors which contribute to the development of the preferences of any individual.

A third factor to be taken into consideration when talking about learning style preferences of members of particular ethnic or cultural groups is the ages of the students. Individual learning style preferences are not static but may change over the course of a lifetime. Perceptual preferences for example, have been found to follow a developmental sequence. Most young children have strong kinaesthetic and tactile preferences (Dunn, Dunn & Perrin, 1994, p. 17), whilst a greater proportion of older students have stronger visual and auditory preferences. Most learning styles research conducted outside the United States, including all the studies mentioned above, has been conducted with older children and adolescents. It would not be advisable to assume that young children of any culture have the same preferences as adolescents of the same culture.

A final, important distinction must be made between ethnicity and culture. Students of the same ethnic group who grow up in different environments, and especially in different countries, have very different experiences. These differences may include, type of education, upbringing, religion, and socio-economic status. Caution must be exercised when generalising findings between countries. There have been few attempts to replicate learning styles research with members of a single ethnic group residing in different countries. One such comparison, involving an instrument other than the LSI or PEPS, was made between the perceptual and sociological preferences of tertiary level Chinese students within the United States and the Peoples Republic of China. Melton's (1990) replication of Reid's (1987) study found that while both groups of students had "multiple major learning style preferences", the students within China has lower means for all preferences, except learning alone. The order of strength of perceptual preferences for Reid's sample was; Kinaesthetic, Tactile, Auditory, Visual. However the order for Melton's sample was: Tactile, Kinaesthetic, Auditory, Visual. Melton attributes the differences in means to the fact that multiple countries of origins were involved and that all of Reid's sample had lived in the United States while none of her sample had ever been out of the People's Republic of China (p. 36).

The limited research conducted with diverse ethnic groups within the United States, and with groups outside the United States suggests that it cannot be assumed that

students with different cultural backgrounds will have similar learning styles preferences. Neither can it be assumed that children will have similar preferences to students of the same ethnic origin who differ in age, experience, and geographic. Furthermore, it cannot even be assumed that children within a single classroom of the same ethnic group and age will have the same learning styles preferences.

c) Giftedness and Special needs

A number of learning styles research studies have been conducted with groups of gifted and talented students, both within and outside the United States. The studies within the United States have included; underachieving gifted high school students (McCabe, 1992/ 1993); gifted high school students (Mein, 1986/1987); gifted middle school students (Paskewitz, 1985/1986); Hervey, 1995/1996); tenth through twelfth grade gifted students (Nations-Miller, 1992/1993); gifted intermediate students (Galluci, 1991/1992); and gifted fourth, fifth, and sixth grade students (Ricca, 1983).

Several of these studies have compared groups of gifted students with the general school population and identified differences between the learning styles of the two groups (Galluci, 1991/1992; Ricca, 1983). Nations-Miller (1992/1993) found differences in the learning style preferences of at risk, vocational, and gifted students. On the other hand, Hervey, (1995/1996) found no difference between the learning styles of students who were nominated and selected for placement in a gifted programme, and those who were nominated but not selected. Other studies have examined the relationship between the learning styles of gifted students and other factors such as; academic achievement (McCabe, 1992/1993); cognitive characteristics (Mein, 1986/1987); and attitudes towards computer programming (Paskewitz, 1985/1986).

Dunn & Dunn (1993) note that a number of studies have demonstrated that gifted students strongly prefer to learn by themselves rather than with other students (p. 13). In a study involving first- and second grade students, including a sub-group of gifted students, Perrin (1984) found that none of the gifted children preferred to work with adults whilst many non-gifted children did choose to work with adults. The possession of multiple perceptual strengths has also been associated with academically gifted

students (Dunn, Dunn & Treffinger, cited in Dunn & Milgram, 1993, p. 18). Global processing style has been associated with both high and low achieving students (Cody, 1983). Dunn & Milgram (1993) attribute the difference between high-IQ and underachieving global students to differences in motivation and relatively late development of auditory and visual preferences in the underachieving global students (p. 20).

Although certain learning style preferences have been associated with groups of gifted students, it is important to remember that individual gifted children have their own unique learning styles. Dunn & Milgram (1993) note that gifted children may become disadvantaged, and even at risk if their individual differences are ignored (p. 22).

Learning styles research involving gifted students has also been conducted in the Philippines (Ingham & Price, 1993, Wallace, 1995), Israel (Milgram & Price, 1993), Guatemala (Sinatra, de Mendez & Price, 1993), Korea (Suh & Price, 1993), Canada (Brodhead & Price, 1993), Brazil (Wechsler, 1993). These studies have involved description of the learning style preferences of gifted or talented students within a single country and comparison with non-gifted students from the same country. They have concluded that it is possible to identify differences in the learning style preferences of gifted and non-gifted students. In a comparison of the findings of the six studies listed above and a similar study conducted in the United States (Dunn, Griggs & Price, 1993), Price & Milgram (1993) found cross cultural differences in the learning style preferences of the gifted students from the eight different countries. However, they also found that some learning style preferences were shared by learners in all eight countries.

In a comparison of variables which discriminated between gifted and non-gifted students from each of six cultures for which comparable data were available, Price and Milgram (1993) found that different combinations of variables discriminated between gifted and non-gifted students from each culture. For example, in the Korean study, the relevant variables were structure, temperature, kinaesthetic and parent motivated. For the American sample however, the variables were kinaesthetic, afternoon, authority figures present, structure, motivation and responsibility (p. 242). They did, however,

also find a number of learning-style preferences that characterised gifted students both across cultures and subject areas or domains of activity. The variables which discriminated most between gifted and non-gifted students were firstly kinaesthetic preference, and then tactile preference (p. 245). The gifted adolescents also described themselves as highly motivated and as having a preference for learning alone (p. 246). In spite of these findings, it would be unwise to assume that any particular learning style preference was shared by all gifted students, or even all gifted students within a single culture, since differences were noted both between individuals within and between cultures.

There has also been a substantial amount of learning-style research involving groups of students who have learning disabilities or special needs, including educable mentally handicapped, learning disabled, and socially and emotionally maladjusted high school students (Ignelzi-Ferraro, 1989/1990); educable mentally impaired, emotionally impaired, and learning disabled students in seventh, eighth grades (Snider, 1985); students with specific learning disabilities in grades three through twelve (Madison, 1984/1986); urban black middle school, learning-disabled students (Williams, 1989/1990); adolescent psychiatric patients (Lengel, 1983/1984); and young adults in need of remediation (Wittenberg, 1984/1985).

These studies generally have concluded that the learning-style preferences of students with special needs differ in important respects from those of the general student population (Lengel, 1983/1984; Madison, 1984/1986; Williams, 1989/1990; Wittenberg, 1984/1985). Some studies that have compared the profiles of groups of students with different special needs have found that some, but not all of these groups differ from each other in terms of their learning-style preferences. Snider (1985), found that the learning styles of educable mentally-impaired students differed from those of emotionally-impaired and learning-disabled students, as well as from general education students. However, no difference was found between the learning styles of emotionally impaired and learning-disabled students. Similarly, Ignelzi-Ferraro (1989/1990) found no differences in the learning styles of three different sub-groups of mildly-handicapped students.

d) Comment

A substantial amount of research has been conducted on the basis of the Dunn & Dunn Learning-Style Model. The research has generally found a moderate but significant effect when instructional methods were matched with individual learning-style preferences. This research has been conducted with individuals across a wide range of ages and academic ability. Comparatively little research has been conducted with younger children and many of the studies that have involved young children have been descriptive, rather than experimental in design. The evidence from these studies suggests that young children may be capable of identifying their own learning style preferences.

Descriptive and comparative studies have found that students from a wide range of ethnic and cultural backgrounds are capable of identifying their own learning-style preferences using the LSI, although most learning-style research conducted outside the United States has involved older children and adolescents. There is no evidence to suggest that young non-native speakers of English are capable of identifying their own learning styles, but neither is there any reason to suppose that they would be incapable of doing so.

Research related to different curriculum areas

a) Areas of research

Learning-style research, utilising the Dunn & Dunn model and instruments has spanned a wide range of curriculum areas. These include teacher inservice training (Hawk, 1983/1984; Spires, 1983); social studies (De Bello, 1985/1986); music (Tiller, 1991); maths (Spires, 1983); reading (Spires, 1983); language arts (Harp, 1990/1991); and other diverse areas such as nursing (McFarland, 1989); court reporting (Coolidge-Parker, 1989); and corporate training (Ingham, 1989/1990).

Research conducted with young children, other than purely descriptive or comparative studies, has mainly involved investigating the effects of learning-styles based instruction in the areas of mathematics (Weinberg, 1983), reading (Wheeler, 1983/1984) and word recognition (Carbo, 1980; French, 1991). There appears to have

been a lack of research using both the Dunn and Dunn Learning Styles model and the LSI:P in the area of second language learning.

b) Research in the field of second language learning

Although there has been a lack of research using the Dunn and Dunn Learning-Styles Model within the area of second language learning, research has been conducted involving other models or instruments (Davis et al., 1994; Melton, 1990; Reid, 1987; Rossi-Le, 1995; Stebbins, 1995; Violand-Sanchez, 1995). The majority of these studies have been conducted with secondary school students or adults rather than young children, and have focused on perceptual and sociological preferences (Kroonenberg, 1995; Melton, 1990; Reid, 1987 ; Rossi-Le, 1995; Stebbins, 1995). Other studies, also conducted with older students or adults have focused on personality dimensions (Carrell & Monroe, 1995; Torkelson, 1995), brain dominance (Davis et al, 1994) and field-dependence/field-independence (Violand-Sanchez, 1995). Most of the studies mentioned above have been descriptive or comparative, rather than experimental, and have been conducted with the intention of determining the existence of group patterns of preference rather than to examine the effects of preferences and methods of instruction on individual achievement.

A number of the studies mentioned above have concluded that a learner's first language background has an effect on his or her perceptual preferences. There has also been a considerable degree of consistency between studies, in the perceptual preferences of students from particular cultural groups. For example, Hispanic students were found to have strong kinaesthetic and/or tactile preferences in three of four studies cited by Oxford (1995, p. 211). Chinese college students were been found to have multiple perceptual strengths in studies conducted in both the United States (Reid, 1987) and the People's Republic of China (Melton, 1990).

In addition to descriptions of learning styles preferences, Rossi-Le (1995) sought to investigate relationships between learning-style preferences and learning-strategy preferences. She reported finding relationships between; preference for group learning and preferences for affective, social and interactive strategies; kinaesthetic preference and preference for authentic language use through seeking out native English speakers;

tactile preference and preference for authentic language use; visual preference and preference for visualization; and a limited preference for individual work and preference for self-directed model building (p. 121).

c) Second language learning as learning

The existence of learning-styles instruments specifically designed for language learners (O'Brien, 1990; Kinsella, 1993; Oxford, 1993) may seem to suggest that language learning is essentially different from other forms of learning. There is disagreement among linguists as to the nature of the second-language learning process. Krashen (1987) claims that secondlanguage acquisition is an unconscious, involuntary process and that deliberate language learning does not lead to the ability to use language. Wong-Fillmore (1991) speculates that language learning involves two types of cognitive processes; a specialized language learning process which is largely responsible for first language acquisition and partly responsible for second language learning, and later developing general learning processes which can be used for a variety of purposes, including language learning. O'Malley & Chamot (1990) took the position that second language acquisition "is best understood as a complex cognitive skill" (p. 19) and that strategies used for language learning can be described within the framework provided by cognitive theory since language learning involves processes and strategies which are shared by other types of learning.

The comparatively recent interest in learning styles, within the second language teaching community, was preceded by interest and extensive research into the use of learning strategies and the possibility of enhancing learning through strategy identification and training. This work began with the idea that if the strategies of "good language learners" could be identified it might be possible to enhance the learning of less successful language learners by training them to use these same strategies (Rubin, 1975). A number of taxonomies of strategies commonly used by language learners have been compiled. Early taxonomies, such as those of Naiman (1978) and Rubin (1981) (both cited in O'Malley & Chamot, 1990, pp. 4-5) consisted of lists of strategies used by informants who were regarded as "good language learners" and were not directly related to more general cognitive learning theory. However it was discovered that the strategies used in language

learning did not differ greatly from strategies used in other domains (O'Malley & Chamot, 1990) and subsequent taxonomies have usually adopted the terminology of cognitive learning theory and the distinction between cognitive and metacognitive strategies. The inclusion of social/affective strategies as a third category, however, seems to be a distinctive feature of second language learning strategy literature. It should be noted though, that some researchers, such as Rebecca Oxford (Ehrman & Oxford, 1990) have preferred to use their own language-learning-specific classification systems rather than adopt those which are in more general use.

The history of intensive and extensive investigation of language learning strategies has important implications for this thesis in two ways. Firstly, because a review of research studies involving strategy training shows that attempts to improve the performance of less successful language learners by training them to use the strategies employed by "good language learners" has had, on the whole, little effect (Lau, 1993). This finding is entirely consistent with one of the basic tenets of learning styles: that there is no single strategy, method, or "one best way" which will work equally well for all learners. The second important implication is that since the strategies used by language learners have been found to be essentially the same as those used for other types of learning, it is not necessary to regard second language learning as a special case or essentially different from other types of learning when it is conducted in a classroom. It is important, however, to recognise that some learners may have opportunities to acquire second languages outside the classroom setting and little is known of the effects of strategy use or learning styles in other contexts.

d) Comment

Although learning styles research has encompassed a wide range of curriculum areas, there has been a lack of research which has used the Dunn and Dunn Learning-Styles Model in the area of second language learning. Furthermore, learning-styles research which has used other models has been conducted with older children and adults, rather than young children and has focused on description and comparison rather than investigation of the effects of matching learning-style preferences with methods of instruction. There is, however, no reason to assume that language learning which takes

place within a classroom context involves different types of cognitive processes, or learning style preferences, than other types of classroom learning.

Summary and implications for this study

The Dunn and Dunn Learning-Styles Model has been extensively researched and an overall examination of the literature has revealed that learning styles have an effect on individual achievement and attitudes. There has been comparatively little research involving young learners, and learners outside the United States of America and an apparent lack of research using the Dunn and Dunn model with second language learners. Research has been conducted with second-language learners (utilising other models and instruments) which has established the relevance of learning styles, and perceptual preferences in particular, to language learning. This research, however, has not been conducted with young children and has been descriptive and comparative rather than experimental.

An examination of the literature on learning styles has revealed that young children have learning style preferences and are capable of identifying and expressing them. Research studies have consistently found that young children express preferences for tactile and kinaesthetic learning activities. These studies have been conducted within the United States of America, and it is possible that young learners in other countries may have different perceptual preferences from American children. Learning style differences have been found between groups of older learners from various cultural backgrounds, but differences have also been found between groups of students of different ages within cultures. Therefore, since there is a lack of existing evidence to suggest that there are any important differences in perceptual preferences among young children from different cultures, it was considered probable that the young children involved in this study would have either tactile or kinaesthetic first perceptual preferences.

Tactile and kinaesthetic instructional methods may be appropriate for a wide range of children, given that research studies have consistently found that the majority of young

children express tactile and/or kinaesthetic perceptual preferences. It was therefore considered likely that auditory/visual teaching methods would be less effective than tactile and kinaesthetic teaching methods for this particular group of young children as a whole.

While it was considered likely that the class as a whole would benefit from the tactile/kinaesthetic nature of the intervention, the majority of intervention studies, including several conducted with young children, have indicated that students make greater gains in achievement when methods of instruction are matched with individual perceptual preferences. It was therefore decided to specifically investigate whether the use of tactile learning materials would be more effective than auditory/visual teaching methods for those children with stronger tactile preferences and whether the use of kinaesthetic learning activities would be more effective for those children with stronger kinaesthetic preferences. It was decided also to investigate whether the children would, in general, perform better when the instructional method matched their perceptual preferences than when it did not match their preferences.

Chapter 3

Design

Hypotheses

1. The first hypothesis was that the children would have either tactile or kinaesthetic first preferences.
2. The second hypothesis was that the traditional auditory/visual teaching methods would be less effective than tactile and kinaesthetic teaching methods for the class as a whole.
3. The third hypothesis was that the use of tactile learning materials would be more effective than the traditional auditory/visual teaching methods for those children with strong tactile preferences.
4. The fourth hypothesis was that the use of kinaesthetic learning activities would be more effective than the traditional auditory/visual teaching methods for those children with strong kinaesthetic preferences.
5. The fifth hypothesis was that the children would perform better when the instructional method matched their perceptual preferences than when it did not match their preferences.

Procedures

The participants

The participants in this study were a group of eight Malaysian kindergarten children, comprising seven six-year-olds and one five-year-old. Their kindergarten is an urban, English-medium, high-fee institution with a favorable teacher/pupil ratio, excellent resources and an English programme provided by a New Zealand educational institution. Most of the parents are professionals and the majority of the children have at least one parent with a foreign tertiary education. The children were all reading and writing English at a standard comparable to NZ primary school children of the same age (in their second year of primary schooling). The children had been learning Bahasa

Malaysia as a second language for at least a year and a half and their level of proficiency ranged from no comprehension at all (two students), familiarity with a few common words (the majority) to native speaker proficiency (one student). While this group of children cannot be regarded as representative of Malaysian children as a whole, they do represent a particular segment of society which provides its children with a great deal of resources but also has very high expectations of their academic performance. These children were meeting these expectations in other areas of the curriculum, but not in Bahasa Malaysia.

The ethnic composition of the group was 1 Eurasian, 1 Malay, 1 Iban, 1 Bidayuh/Chinese, and 3 Chinese. The ethnic composition reflects the composition of this particular kindergarten, but not of Malaysian kindergartens as a whole. There were five girls and two boys. The male/female ratio reflects the composition of this particular class, but not the kindergarten as a whole. Learning style profiles and results have not been classified according to sex or ethnic group because the size of the sample would enable identification of individual students by people not directly connected with the intervention and this would be unethical. However, the only child whose performance, but not learning style, was markedly different from the group as a whole was a student who spoke Bahasa Malaysia as a first language and was therefore inappropriately placed into this second language class.

Sample selection

The children who participated in this study represent the majority, or eight of eleven, of an intact class rather than a randomly selected sample. The reason this group was selected is that the teacher concerned wished to engage in action research, using this particular class to trial new (for her) teaching methods. While it may have been useful to have a control group, it was not possible to exclude children from the class or to use any other class as a control group, and this necessitated an own control design. The results and profiles of three children of the total of eleven children in the intact class have been excluded because their parents did not want their children's personal information to be included in this study. These children did not differ from the others in the class in terms of race, sex, learning style or language proficiency.

Ethical considerations

Ethical considerations must be taken into account in any form of research but are particularly important when the research involves young children. Snook (1981) lists the following basic requirements for ethical research conducted on humans, "avoid harm, secure consent, minimise deceit, and ensure that the subjects' confidentiality is assured" (p.54). The researcher, teacher and kindergarten management considered that since the new tactile and kinaesthetic language teaching methods were entirely consistent with existing tactile and kinaesthetic teaching methods already being used throughout other areas of the curriculum, it was unlikely that they would be the cause of any harm. Furthermore, these new teaching methods were to be used in addition to the traditional auditory/visual methods rather than replacing them completely. Consent was obtained from the children's parents and deceit was kept at a minimum by informing the children that the purpose of the intervention was to try out new teaching methods to see if they were suitable. They did not, however, have the experimental design explained to them and they were not informed of the differences between experimental and control lessons. Confidentiality has been safeguarded, as far as possible, by omitting references which would enable the identification of individual children by anyone not closely associated with them. Some case study information which might have been useful has also been omitted, where it has been felt by the researcher that the information was privileged.

Snook (1981) also cautions against the use of children in educational research where the research is not of direct benefit to the children involved, but is solely for the purpose of collecting general findings or "data" which may benefit some other group of children. The primary purposes of this intervention were to enhance the effectiveness of the Bahasa Malaysia teacher, and to cause positive changes in the achievement and attitudes of the children. The information collected during the intervention was intended to be of direct benefit to the teacher and children involved, as well as for the purpose of obtaining general findings or "data" for this thesis. At the end of the intervention, the parents of the each child were provided with the individual learning profiles of their child and a report on the effect of the intervention on that child.

Preliminary assessment and planning

The class teacher expressed concern about the children's performance in January, one month into the school year. She believed that the children were learning little, had no interest in Bahasa Malaysia, and that a number of them had no aptitude for learning the language. It was decided to monitor the children's performance in monthly spelling tests and the first semester examination in April. At the same time the teacher was provided with at least two hours a week of training and supervision in such aspects of teaching as course design, lesson planning, teaching methods, and materials preparation.

The mid-year assessment showed that several of the children had begun to acquire some Bahasa Malaysia vocabulary but others continued to understand almost no Bahasa Malaysia. Furthermore, the teacher had only introduced forty words in the preceding five months because she felt that the children could not remember them. It was decided to trial new teaching methods, based on the children's perceptual preferences, while at the same time increasing the number of new words introduced each week, in order to increase the rate of vocabulary acquisition.

Training Component

All teachers in the school completed the Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn & Price, 1990), the adult version of the LSI, and participated in several learning-styles related training sessions. The first session involved; discussing their personal preferences, as indicated by the PEPs profiles; the implications these differences had for themselves in terms of working with each other and their students; and the implications of differences in learning styles among their students. The second session involved; discussing problems which had occurred in the teaching of mathematics; the examination and discussion of tactile mathematics learning materials; and suggestions for classroom use. The third session involved learning how to make effective tactile teaching resources.

Measurement and instrumentation

The Learning Style Inventory: Primary

The children's learning styles were assessed using the Learning Style Inventory: Primary (LSI:P) (Perrin, 1991). This instrument is based on the Learning Style Inventory (LSI), (Dunn, Dunn & Price, 1989) which was designed for students in grades 3-12. The LSI was developed through content and factor analysis and is described as "a comprehensive approach to the identification of an individual's learning style" (Perrin, 1991, p. 3). The LSI has been extensively tested and evaluated and has been found to be one of only a few style instruments to have good reliability and validity (Curry, 1987, cited in Dunn & Dunn, 1993, p. 37). It has also been described as having established "impressive reliability and face and construct validity" (Kirby, 1979, cited in Perrin, 1991, p. 3). The LSI also reports a Consistency Key to provide information on internal consistency for each student.

The LSI:P differs from the LSI in that it is administered verbally and uses forced choice questions in contrast to the written questionnaire and Likert type scale used by the LSI. It also does not provide any information on internal consistency. The LSI:P does, however, appear to have very good face validity because the items refer to activities which are directly relevant to most young children and their learning experiences. Test-retest reliability was established for the LSI(P) by Perrin (1991) with a group of three hundred first- and second-grade students. The percentages of children who did not change their preferences over a period of 5 months ranged from 65% for the element of Structure to 100% for visual perceptual preference. The percentages for the Perception subscale were; Visual, 100%, Auditory, 89%, Tactual, 89%, and Kinaesthetic, 95%. The LSI:P does not have as extensive a research backing as the LSI but there is evidence that indicates that it is a useful tool for assisting children to identify their individual learning styles (Perrin, 1991).

The LSI:P uses an individual structured interview to inquire into children's self-expressed preferences for learning conditions and stimuli. In some ways the LSI:P differs considerably from versions of the LSI which are used for older children and adults, in the way it is designed, administered and scored. The LSI:P is conducted in

the form of an interview, rather than a questionnaire and the children are provided with a series of pictures to help them understand and answer the questions. The LSI:P also utilizes forced choice questions, unlike the LSI and the PEPS which require respondents to indicate their strength of preference on each item. The simpler forced choice format of the LSI:P has the advantage of being more easily understood by young children, but it does not enable children to express multiple strong preferences within subscales. For example, while cool and warm environments are mutually exclusive, different forms of motivation are not. It is possible for learners to be both highly adult motivated and highly teacher motivated but it is impossible to score highly on more than one option within a single subscale of the LSI:P.

The structured interview format and use of pictures to illustrate the concepts not only helps children to understand and identify with the questions, but also gives them an opportunity to respond through the perceptual modality of their choice. In other words, although the format suggests that they respond verbally, it is possible to allow them to touch the pictures in response, or demonstrate the action, or even write down their responses if they so choose. In this case, large posters with stick on cut-out figures were provided so that the children could see, as well as hear, the available options and respond non-verbally if they wanted to. The children in this study responded to the interviews in a variety of ways. Some listened and responded verbally, and did not touch the posters or figures at all while others listened and pointed to the preferred option. Others took the figures out of the interviewer's hand and moved them around as they spoke, and yet others physically demonstrated their preferences, for example by standing up and wriggling as they explained how they felt when required to sit on a chair for extended periods of time. The ways in which these children chose to express their learning style preferences tended to reflect their expressed perceptual preferences. The children with the strongest tactile preferences were those who needed to pick up the cut-out figures and touch them as they spoke, while the children with the strongest kinaesthetic preferences spontaneously chose to demonstrate their preferences physically.

The LSI:P contains twelve sets of questions to establish individual preferences within twelve subscales; sound, temperature, motivation, structure, perception, time, light,

design, responsibility and persistence, sociological preferences, intake and mobility. Questions related to each learning styles element are asked en bloc, instead of being mixed up and spread throughout the interview.

Administration of the set of questions for the perception subscale involves first showing the child a card with four pictures illustrating different perceptual preferences and then asking 9 forced choice questions of the type:

“1. When you have something important to learn, which is the better way for you to remember it?

listen to a story about it on a tape recorder?

Or

see a filmstrip story about it?”

Before the LSI:P was administered, it was decided that some of the items were unsuitable for this group of children since they mentioned activities with which the children had no experience. Some items were changed to reflect the actual activities the children had engaged in, without changing the type of activity or perceptual modality, i.e “filmstrip” was changed to “video” and “record” was changed to “tape”. The items referring to kinaesthetic activities posed more of a problem since the children did not engage in most of these specific activities, e.g. the children had not played with blocks or made models with clay for a number of years. It was decided to change the activities mentioned to other kinaesthetic activities in which the children were accustomed to engage at the kindergarten. The original and amended items can be seen in **Appendix 1**.

Another limitation of the LSI:P was not discovered until during the interviews- there are no questions about reading. The effects of this omission soon became apparent during the interviews. When asked to choose the cut-out figure which represented the way they remembered things best, a number of children chose a picture of a girl looking at a book and said, “This one, I like to read best.” even though earlier they had not expressed a preference for looking at pictures. Not only did the children distinguish between “looking at pictures” and “reading”, but several also explained that they

preferred listening to stories rather than watching videos because they liked the human interaction. In this case, the children were expressing sociological rather than perceptual preferences. These responses raise questions as to the appropriateness of the Visual perceptual preference items on the LSI:P for literate children, and are also a reminder that single preferences seldom express themselves in isolation from other elements in the learning environment.

Despite the cultural inappropriateness of the wording and of some of the activities referred to, the LSI:P proved to be capable of providing useful information regarding the children's perceptual preferences, as well as other aspects of their learning styles. This is because the LSI:P is more properly treated as a structured interview, capable of adaptation, which enables children to explore their preferences, challenge the items and elaborate on their responses. However, this requires adequate time and a relationship with the interviewer which encourages active participation of the children in the interview rather than the single syllable responses which the forced-choice format might seem to suggest.

The role of the researcher

My role in relation to the children and their teacher was an important factor in this study. As the teacher's trainer and supervisor I had the task of supporting her development, while ensuring that the children engaged in worthwhile learning activities. The roles of trainer and supervisor can easily come into conflict so I decided to scaffold her development through joint engagement with her in a project which was of mutual benefit (Tharp & Gallimore, 1988). Hence the aims of this project were three-fold: to provide me with an opportunity to conduct research for this thesis; to enable her to acquire new skills and confidence as a teacher; and to enhance the learning of her students.

My role not only enabled me to ensure that the project was of direct benefit to the participants (Lather, 1986) but allowed me close contact with the teacher and the children. They granted me the privilege of free entry to their classroom and treated me as a natural part of the classroom environment. I observed every lesson during the intervention phase, as well as a substantial number of previous lessons. During the

intervention phase, a diary was kept of any events which were of interest or which could have a bearing on the conduct and results of the study. This provided important insights into the strengths and limitations of the research design and methodology and ensured that the procedures were in fact being carried out by the teacher. The participant/observer role assigned by the teacher and children was invaluable during the LSI:P interviews. The children felt comfortable talking to me about themselves as they had already identified me as someone who was interested in them, and their opinions, and would not get angry at what they wanted to say.

Administration of the LSI:P

Young children need to be introduced to the concept of learning styles preferences before the LSI: P interviews are conducted. This group of children had one whole-class session with the interviewer, reading *Elephant Style* (a booklet designed to explain learning styles to young children), discussing learning styles, and playing with posters and cut-out figures which illustrated various learning style preferences. One week later the children were interviewed to establish their views on their perceptual preferences, as well as other aspects of their learning styles. The posters and movable figures proved to be invaluable, since they enabled shyer children to show their preference by selecting and positioning the cut-out figures and objects.

Measurement of vocabulary acquisition

The vocabulary to be introduced during the intervention was selected by the teacher on the basis of the needs and interests of the children. The topics chosen were the topics which had already been planned for the final term, the period in which the intervention took place. It was not possible, or desirable to use a standardised test to measure vocabulary acquisition, since the vocabulary to be learned and tested was based on the needs of this particular group of children. The format used for most of the tests was a picture/word matching exercise which required the children to look at a list of ten words and draw a line from each word to one of ten pictures on the other side of the paper (**Appendix 2a**). The children were already familiar with this question format. During two weeks, the tests were conducted orally and the children were required to listen to each word and point to (or touch) the correct picture on a large chart. The

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children were also already familiar with oral testing.

The attitudes questionnaire

Information was obtained about the children's attitudes to Bahasa Malaysia and their beliefs about the language and themselves as language learners through the use of a questionnaire which was routinely administered to all language classes in the kindergarten (**Appendix 3**). The questionnaire was administered orally, and by teachers other than the language teachers. In the case of this class, the questionnaire was administered at three times during the year. The first administration was in January, the second was in August, and the final administration was in October.

The Intervention

This phase was carried out over 7 weeks of the final school term. The class continued to follow its normal schedule of two half hour Bahasa Malaysia periods per week, although two lessons had to be scheduled for different days due to a class trip and unplanned teacher absence.

During the first week of this phase, the teacher continued to use her normal teaching methods but each lesson was pre- and post- tested in order to familiarise the children and the teacher with the tests and procedures which were to be followed during the remaining six weeks of the term. In each of the following six weeks, a control lesson was alternated with either a tactile or kinaesthetic lesson. The order of these lessons was varied to account for any order effect, i.e the children learning more, or less in the second lesson on the same topic.

The lesson schedule for the final term was as follows:

Table 3.1
Lesson Schedule for the Intervention

WEEK	LESSON	TOPIC	LESSON TYPE
1	C1A C1B	WEATHER OCCUPATIONS	CONTROL CONTROL
2	T2A C2B	VEGETABLES VEGETABLES	TACTILE CONTROL
3	C3A K3B	ACTIONS ACTIONS	CONTROL KINAESTHETIC
4	T4A C4B	IN THE CITY IN THE CITY	TACTILE CONTROL
5	C5A T5B	AT HOME AT HOME	CONTROL TACTILE
6	K6A K6B	COOKING COOKING	KINAESTHETIC CONTROL
7	C7A K7B	HEALTH HEALTH	CONTROL KINAESTHETIC

Description of lesson types

All lessons were jointly planned by the teacher and researcher. The teacher selected 20 new words to be introduced each week, and whenever feasible the researcher assigned these words randomly to either the control lesson or experimental (tactile or kinaesthetic) lesson. It was not possible to randomly assign words in weeks six and seven. For the cooking sessions in week 6, recipes with comparable ingredients and utensils were chosen, rather than randomly assigning the vocabulary, since random assignment of ingredients would have resulted in inedible products. For the control and role play sessions in week seven, it was necessary to assign the words on the basis of equipment available. Producing language teaching materials, especially tactile materials, is a time-consuming task and so the researcher designed, produced, or gathered all the teaching and learning materials used during the control and

experimental lessons. The teacher then wrote her lesson plans, in conjunction with the researcher, based on the materials provided and the specified teaching methods for the lesson.

Control lessons

During these lessons, the teacher used her normal teaching methods which mainly utilised the children's auditory and visual perceptual modalities. In other words she talked to the children, and showed them pictures and words. During some of the control lessons the teacher used custom-made charts which contained only the pictures and words which had been selected for that particular lesson. During the control lesson on Actions in week three (C3A), the teacher performed the relevant actions, for example by standing up herself as she said "berdiri" and sitting down as she said "duduk". In week five she gave a cooking demonstration, and in week seven she used a picture dictionary.

The control lessons, and the materials for them, were made as clear, interesting and attractive as possible in order to provide a fair comparison with the experimental lessons. Furthermore, while the content, materials and planned activities were controlled, the children were not prevented from engaging in normal tactile and kinaesthetic activity during the control lessons. Some children spontaneously reached forward and touched the pictures on the charts as the teacher talked about them. Case Study notes for Child D show that during control lessons she moved herself to a position directly under the easel and reached up and touched the pictures as the teacher talked about them (p. 70 below). During the control lesson in week 7, C7A, Child B not only touched the pictures the teacher was referring to but also touched other pictures and quietly said the words to herself as she did so (p. 65 below). In the third week of the intervention, the control lesson was supposed to involve the children sitting and watching the teacher perform actions as she said the words. The researcher's diary notes of the lesson show that this was far from what actually occurred. In fact the whole class spontaneously copied the teachers actions as she demonstrated them. The first word the teacher introduced was "berdiri" (stand up). The children did sit and watch as she stood up to demonstrate the meaning of this word. The teacher then said the next target word "duduk"(sit down) and sat down.

When the teacher said the word “berdiri” a second time, the children spontaneously leapt to their feet. The teacher was more than a little upset at this departure from the way the lesson was supposed to be conducted and said “Duduk, duduk!” and the children sat down and laughed. At that point the researcher intervened and reassured the teacher that it was more important for the children to learn the target language, and enjoy doing so, than it was for them to conform to the specifications of the control lessons.

As the examples listed above indicate, it became apparent that it was not possible, or desirable, to prevent the children from spontaneously engaging in unplanned learning activities during control lessons. Therefore, a qualification needs to be made to the design of this intervention study, in that as the children became more active learners they changed the nature of the control lessons and engaged in tactile and kinaesthetic activities at will.

Experimental lessons

a) Tactile

Learning through the tactile perceptual modality involves taking in and storing information while performing activities which involve one's hands. While these lessons have been labeled as “Tactile”, this was not the only modality used by the children during “tactile lessons”. It would be very difficult, and very unwise to attempt to conduct a language lesson without any visual or auditory stimuli (unless the learner is visually- or hearing-impaired). Language learning generally requires that the learner either see or hear the words. The tactile lessons involved the substitution of tactile resources and activities for the normal auditory/visual activities but the children engaged in plenty of looking, talking and listening at the same time.

i. Lesson T2A- Vegetables (Sayur-sayuran)

The children were given a worksheet which required them to write the names of vegetables under their pictures and then colour in the pictures according to a key. They were also provided with tactile learning materials such as flipcharts, electroboards, taskcards, vocabulary wheels, pic-a-holes and word/picture windows to use in conjunction with the worksheet (For examples of tactile learning activities see **Appendix 4**).

ii. Lesson T4A- In the City (Di Bandar)

The children were given a large picture of a city scene which contained boxes with words written in and another piece of paper with pictures which corresponded to the words (**Appendix 5**). Their task was to cut out the pictures and stick them in the correct places. Once again they were also given tactile learning materials of the type mentioned above.

iii. Lesson T5B-At Home (Di Rumah)

The children were given a choice of three worksheets to complete. Some chose to do more than one worksheet. Once again they were also given tactile resources which they could use to find the answers or to play with.

b) Kinaesthetic

Kinaesthetic learning activities involve the use of the whole body. These lessons also included visual and auditory stimuli.

i. Lesson K3B-Actions (Pergerakan)

The children played a game which involved one member of their team being given a card with a picture, or word representing an action on it. This person had to mime the action and the teammates had to guess what it was and say the word in Bahasa Malaysia. Each team was also supplied with a chart which contained the relevant pictures and words. If the team guessed the word incorrectly, the other teams had a chance to answer. During each round, a different team member was expected to perform the action.

ii. Lesson K6A-Cooking (Memasakkan)

The children were asked to make banana fritters. They were given a recipe in Bahasa Malaysia, and needed to ask their teacher, in Bahasa Malaysia, for any ingredients and utensils they required.

iii) Lesson K7B-Health (Kesihatan)

The children pretended to be doctors, nurses and patients and used instruments and materials which corresponded to the target vocabulary. The teacher told them the Bahasa Malaysia names for the instruments and materials as they played. It had been planned that the instruments and materials would also have written labels attached to them but it was not noticed that this had not been done until the lesson was underway and too late to be changed. This unfortunately resulted in this lesson differing from all

the previous lessons in that it was the only lesson in which the children were not able to see the target vocabulary in written form.

Data analysis

Various types of information were gathered about the children, their learning styles, attitudes, and academic performance both before and after the intervention. This information has been organised in two ways, as case studies and as statistical information. In some cases, the same information has been presented in both the case study and statistical sections. The information has been organised in this way because the qualitative and quantitative information complement and inform each other, and when combined enable a better understanding of both group trends and individual differences.

Case studies

The type of information gathered for the case studies, and the way it used is will be described in the introduction to **Chapter 4**.

Statistical results

The first hypothesis in this study was tested by means of the a standardised questionnaire procedure (perhaps more correctly described as a structured interview), the Learning Style Inventory (Primary) (Perrin, 1991).

The second hypothesis was tested by means of a non-parametric test, namely the Wilcoxon Signed Ranks test using an exact p-value (actually a Monte Carlo approximation to the exact p-value). The third, fourth and fifth hypotheses were tested by means of another non-parametric test, namely the Mann-Whitney U test. These tests were used because of the own-control design and, in the case of the Wilcoxon Signed Ranks Test, the use of an exact p-value method is the best that can be done with the lack of adequate subject numbers in the experiment. Parametric tests would be unsuitable in this case.

When the analysis involved the same children at different times (during pre- and post-testing) or under different conditions (during experimental and control lessons), then the Wilcoxon test was used. When the data were obtained from different subgroups (for example, comparisons of children with weak or strong Kinaesthetic preferences), then the Mann-Whitney U test was used.

The statistical procedure is found in Mehta and Patel (1995), The SPSS Exact Tests 6.1 for Windows. As Siegel (1956) states of the sign test, it utilizes information about the direction of the difference within pairs. If the relation magnitude as well as the direction is considered, a more powerful test can be made. The Wilcoxon Matched Pairs Signed Ranks Test does just that. It gives more weight to a pair which shows a large difference than to a pair which shows a small difference (ibid., p.75).

Siegel (1956) goes on to say that the Wilcoxon test is the most useful test for the behavioural scientist, requiring only that the researcher can tell which member of a pair is “greater than which” and can “rank the differences in order of absolute size”. It is this which the Mehta and Patel procedure does, applying also an exact test of significance to the resultant statistic. He also notes that the test has similar power to the parametric t-test (p.83). Siegel sees the Wilcoxon test as “a most useful test for the behavioural scientist” requiring only that the researcher can tell which member of a pair is “greater than which” and can “rank the differences in order of absolute size” (op. cit. p. 75). Fox (1969) also supports its use in classroom research.

In regard to the Mann-Whitney U test, it can be said broadly that it tests whether there has been a shift in the distribution of Experimental and Control groups, so that in the present case it is a question of how pre-post differences move between the two groups. In Siegal’s terms (op.cit. p.116), the Mann-Whitney U test “may be used to test whether two independent groups have been drawn from the same population” . It is seen as “one of the most powerful of the non-parametric tests, and it is the “most useful alternative to the parametric t-test” (op.cit. p.116)

In the present study, the two distributions are those of groups defined by their perceptual preferences. In discussing very small samples (an example of $n_1=3$ and

$n_2=4$ is given), Siegel provides the procedure for determination of the exact probability of the U statistic using tables. The Mehta and Patel procedure provides this exact probability estimate. Fox again supports its use with ranked characteristics of pupils in two or more groups; of the available tests, the Mann-Whitney U is regarded as the preferable, where its conditions are fulfilled, "because it is the most powerful" (op.cit p.273). The statistical test is as a result unavoidably conservative.

In the present case, the null hypothesis that the two populations have the same distribution has particular cogency because a learning effect from the experimental lessons to the control lessons is possible. Then while two populations exist for each week, namely the Experimental Lesson and the Control Lesson, the difference between this design and others is that a series of lessons of fairly long duration (seven weeks) occurred during which, while a Control lesson and an Experimental lesson each week were independent of each other, there was no possibility of preventing the development of a generalised learning to learn effect (or set) which could result in good learning under both Experimental and Control lessons. As a result, and examination of the raw scores can test whether it was so, there could be a general gain effect which disguises the effects of the Experimental lessons.

Chapter 4

Case Studies

Introduction

Learning styles research has usually relied on quantitative data to determine the value of learning styles models and interventions and has involved the aggregation of profiles and results of large numbers of children, in order to obtain data amenable to analyses designed for larger numbers. While large samples are important in establishing the validity and generalisability of learning styles measures, it is possible that important individual differences are obscured in the process. However, the LSI:P is also capable of providing useful descriptive information about individual children, which can be combined with information from other sources, such as direct observations, children's personal comments, questionnaires, and test results to provide valuable qualitative information about the effects of learning styles preferences and different instructional methods on individual learning. This type of qualitative information is also important if the aim of instruction is to maximise individual learning through attention to individual needs.

Seven of the nine children in the group are girls and so it was decided to use feminine pronouns when referring to all the children because the small size of the group would enable easy identification of individual boys. Similarly, students have not been identified by ethnic group, or age since in some cases this information would lead to identification of individual children. Whilst none of the information included in the case studies is of a particularly sensitive nature, and the parents of all these children consented that the information be used, it was still considered important that anonymity be safeguarded as much as possible.

Types of information collected for individual children

a) Learning styles profiles

A learning styles profile was created for each child, using the Summary Profile form included in the Learning Style Inventory Primary Version: Manual for Administration, Interpretation and Teaching Suggestions (Perrin, 1991) based on the full results of the LSI:P interviews.. Full profiles, using all twelve LSI:P scales are important for normal classroom learning styles implementation, because while a single factor, such as perceptual preferences may be important for many children, any of the other factors may be just as important, or even more important for individual children. This information can also help explain why matching instructional methods to perceptual preferences may work for some children at some times, but not at other times, and may not be very important to some children at all.

b) Information about language learning attitudes and beliefs

It was considered important to monitor the effect of the teacher training and intervention phases on the children's attitudes to their language learning because attitudes and beliefs are important determinants of present and future language learning success and also because the children's welfare and happiness were of primary importance to all concerned. The Language learning attitudes and beliefs questionnaire (**Appendix 3**), a teacher-created questionnaire, was used for this purpose. This questionnaire is routinely administered to all language classes by the principal or other senior teachers who are not involved in language teaching. Its intention is to provide feedback to the language teachers regarding the children's reactions to their language learning. This sort of information is not necessarily apparent to teachers who teach each class for only two half hour periods per week. The questionnaire is normally administered twice a year, but in this case it was administered to the class three times: in early January before the teacher training began, in early September a few weeks before the intervention phase, and in the middle of October, immediately following the intervention phase. The first administration enabled the teacher and researcher to establish initially that some of the children were not confident about their Bahasa Malaysia learning ability and not particularly happy during Bahasa Malaysia lessons. The second administration indicated that some children had developed more positive

attitudes, but some children still had little confidence in their ability to learn the language. The third administration showed an overall gain in confidence in language learning ability and positive attitudes towards the target language.

c) Results of pre- and post-tests

The pre- and post-testing provided information about the level of difficulty of the target vocabulary for individual children, and the amount of vocabulary acquired in each lesson. It was clear that in the beginning of the intervention phase, many of the children had difficulty recognising most of the target vocabulary in the pre-tests and therefore the amount of new vocabulary introduced each lesson was extremely challenging. However, by the middle of the intervention phase pre-test performance improved markedly for many of the children. By the end of the intervention it was apparent that a number of the children may have been able to cope with a greater amount of new vocabulary than was being introduced and tested, while the remaining children's pre- and post-test performances had improved to an extent that the amount and level of difficulty of the new vocabulary was now considerably more appropriate for them than it had been at the beginning of the intervention phase. The pre- and post-test results also enable comparison of the effects of different lessons on each individual child's performance, and consideration of the relationship between learning styles preferences, instructional methods, and individual performance.

d) Results of oral tests

In two of the seven weeks of the intervention, pre- and post-testing was conducted orally (**Appendix 2b**). During these tests the children were tested individually and heard, rather than saw, the target words while they looked at a chart with pictures which corresponded to the words, or to actual objects. Instead of drawing lines to match words and pictures, the children were required to touch or point to the objects represented by the words. This procedure did not require the children to be able to recognise the words visually, but enabled them to demonstrate that they understood the meaning of the words when presented aurally. None of the children performed worse in the oral tests than they did in the written tests, but some of the children performed substantially better in oral tests than they did in written tests. This information showed that children who were not performing particularly well in written

tests were still acquiring the target vocabulary even though they were not necessarily capable of reading it. This information is particularly important in the case of young children, such as these, in the early stages of language acquisition who are still developing literacy skills in their first language, and who may not have begun to transfer these skills to the target language.

e) Final examination results

The final examination (**Appendix 6**), which consisted of fifty words, or half the vocabulary introduced during the first five weeks of the intervention, provided information about the long term effects of each type of lesson on recognition of the target vocabulary. Long term effects of language lessons are of more interest to language teachers than the results of tests conducted immediately following lessons since short-term recognition cannot be regarded as a reliable indicator of language acquisition. All of the children obtained perfect scores on the oral component of the final examination which indicated that they had indeed learnt the meanings of the words. However, performance on the written component varied considerably. This suggests that the differences in performance on the written tests, both during the intervention phase and in the final examination, may have to a certain extent reflected differences in Bahasa Malaysia literacy skills rather than understanding of the vocabulary itself. Interestingly, some children recognised more words in the final examination than they had during the post-tests.

f) Direct observations and children's comments

The researcher conducted the LSI:P interviews and was present during all experimental and control lessons. A diary was kept of events which seemed relevant to the conduct of the intervention. This record included photographs and observations of the children's reactions to the lessons as well as their spontaneous comments. This information has been included in the case studies where it has seemed to add relevant information to the other types of data.

Profiles of individual children

Child A

a) Learning style preferences

Order of perceptual preferences: Tactile(5),Kinaesthetic(2)/Auditory,(2),Visual(0).

This student indicated definite preferences on seven out of the eleven other subscales on the LSI:P. She prefers a quiet, cool, well-lit learning environment and would rather study in the evening. She does not require mobility. She feels strongly that she is responsible and persistent and that she needs little structure. On the motivation scale, she is teacher and self motivated, but not adult motivated. However, she does not mind whether she works with an adult, peers, or alone.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student gave negative or uncertain responses to all questions.

September: She still felt that Bahasa Malaysia was not interesting, but gave positive answers to all the other questions.

October: She gave positive responses to “Bahasa Malaysia is easy to learn” and “Bahasa Malaysia is a good language” and responded very positively to all other statements.

c) Effect of intervention

At the beginning of the intervention, the amount and level of difficulty of the new vocabulary was clearly at an appropriate level for this student. The student obtained an average of 4/10 in the pre-tests during the first three weeks of the intervention. However, from the fourth week her pre-test results improved and averaged 6/10. She gained between 0-3 words per lesson in the control lessons, gaining an average of 2 words per lesson in the 8 control lessons. However during the experimental lessons she gained between 2-5 words per lesson, with an average gain of 3.5 words per lesson over the 6 lessons. During the Tactile lessons (matched for perceptual preference) she gained 2-4 words per lesson with an average gain of 3 words over the 3 lessons. As a result of her improved performance in the pretests and the consistent vocabulary gains in the experimental lessons, she scored 10/10 in 4 of the 8 final lessons and appeared to

be capable of learning more vocabulary per lesson than was being deliberately introduced and tested.

In the final examination, she scored 10/10 in the oral test, and 37/40 on the written test, with 100% recognition of the control and tactile words.

d) Comments

The student clearly benefited from the intervention. The increase in pre-test scores suggests that her level of language competence increased over the period. Perhaps the increase in rate of vocabulary acquisition which occurred as a result of the intervention caused her to become more “tuned-in” to the target language and this not only helped her to learn the target vocabulary when it was presented in class, but also had a generalised effect on her language learning. Since, by definition, a second language is one that is spoken by other people in the community, second language learning is not necessarily confined to the classroom but can occur spontaneously in natural settings.

Her tactile preference was confirmed, with an overall gain of 9 words over the 3 tactile lessons compared with 4 words over the corresponding control lessons. However, she also performed well during the kinaesthetic lessons with a gain of 12 words over the three kinaesthetic lessons compared with 7 words in the corresponding control lessons. Overall, she gained only 13 words over the 8 control lessons. This is probably due to the fact that the kinaesthetic lessons provided greater opportunity for the student to exercise her tactile preference than the control lessons. During the kinaesthetic lessons the student was having her first three perceptual preferences, tactile, kinaesthetic and auditory matched simultaneously and this condition proved the most likely to enhance her short-term vocabulary acquisition. However, in the final written test, the student obtained perfect scores on the control and tactile words, but only 5/8 on the kinaesthetic words despite obtaining a perfect score on the oral test. This suggests that for this student, vocabulary acquired during kinaesthetic lessons may not be recalled in visual form as easily as in aural form over a longer term.

Child B

a) Learning style profile

Order of perceptual preferences: Tactile(4),Kinaesthetic(2)/Auditory(2),Visual(1).

This student indicated definite preferences on seven out of the other eleven subscales on the LSI:P. She has a strong preference for a cool, brightly lit, formal learning environment and a strong need for structure. She does not want to eat or drink while studying, feels responsible and persistent, and is teacher, adult and self motivated. She prefers to work with adult or peers, but not alone.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student responded positively to all the statements and very positively to “Bahasa Malaysia is easy to learn” and “I am good at Bahasa Malaysia”.

September: She responded negatively to “Bahasa Malaysia is easy to learn”. She responded positively to all other statements and very positively to “I enjoy learning Bahasa Malaysia”.

October: She was uncertain about “My Bahasa Malaysia teacher thinks I am a good student”. She responded positively to all other statements and very positively to “I like Bahasa Malaysia”, “I enjoy learning Bahasa Malaysia”, “I feel happy during Bahasa Malaysia lessons”, and “I can learn Bahasa Malaysia”.

c) Effect of intervention

At the beginning of the intervention, this student’s performance on the pre-tests suggested that the amount and level of difficulty of the new vocabulary might have been too demanding for her as she scored an average of 2/10 on each of the first 4 pre-tests. However, her performance in the first two control lessons showed that while she had very little existing Bahasa Malaysia vocabulary, she was a very competent language learner, gaining six new words in each of these lessons. She continued to perform well in most of the subsequent lessons and by the third week of the intervention period she was also performing better in the pre-tests, with an average pre-test score of 5/10.

She gained between 0-6 words per lesson in the control lessons, gaining an average of

3.4 words per lesson over the 8 control lessons. However, during the experimental lessons she gained between 0-7 words per lesson, with an average gain of only 2.8 words per lesson over the 6 lessons. During the Tactile lessons (matched for perceptual preference) she gained 1-7 words per lesson with an average gain of 3.3 words over the 3 lessons, compared with 3.6 words over the corresponding control lessons. However, during the second half of the intervention period it was impossible for the student to continue to demonstrate large vocabulary gains because her pre-test scores had risen substantially, averaging 6/10 per lesson. Towards the end of the intervention period, the student was working at a level of difficulty which was comfortable for her and she was clearly deriving a lot of satisfaction from her performance.

In the final examination, the student scored 10/10 in the oral test, and 37/40 on the written test, with 90% on the control words, 100% on the tactile words, and 87% on the kinaesthetic words..

d) Comments

The intervention was of benefit to this student. As with Child A, the increase in pre-test scores suggests that this student's level of language competence increased over the period, perhaps also due to increased confidence and language awareness.

The student's tactile preference was neither confirmed nor disconfirmed, with an overall gain of 10 words over the 3 tactile lessons compared with 11 words over the corresponding control lessons. However, she did perform better in two out of three of the tactile lessons than in the corresponding control lessons. She also performed slightly better overall in the kinaesthetic lessons than in the corresponding control lessons with a gain of 7 words over the three kinaesthetic lessons compared with 4 words in the corresponding control lessons. However, most of these words were gained in the game lesson, Kinaesthetic 3B, which had strong visual and auditory content.

While this student clearly benefited from the intervention, and made more vocabulary gains over the six experimental lessons than over the corresponding control lessons,

her responses to the experimental lessons provided an illustration of how other learning styles variables can, either alone or in combination with perceptual preferences, influence an individual student's learning. In the case of this student, her strong need for structure was clearly important. The control lessons were teacher centered and the student's attention was directed to each target word in turn. However, the tactile lessons had little overt structure. The students were given a choice of worksheets and tactile resources and allowed to do whatever they chose. This arrangement suited most of the students because of their low need for structure and they were happy to be given choices. However, this student had difficulty making choices and responded by asking the teacher what she should do. After she had completed each activity she asked the teacher what she should do next, seeking to satisfy her need for structure. It is clear that this student would have been better catered for if she had been given clear direction at the beginning of the lesson.

This student had also indicated a preference for working with peers, or with the teacher and a definite preference for not working alone. The tactile activities did not preclude working with peers, but neither did they require it. Consequently, this student ended up working alone, despite her sociological preference, unless the teacher went to work with her. In the light of the student's preference for structure and group activity, it is not surprising that she performed so well in the first kinaesthetic lesson, Kinaesthetic 3B. This lesson was a team game, with clear rules and refereed by the teacher. The student made a gain of 6 words on this lesson, in contrast to 0 words in the corresponding control lesson.

It is also not surprising that the student performed very badly in the second kinaesthetic lesson, Kinaesthetic 6A. This lesson was a cooking lesson and while it would have suited the student's sociological needs, since the teacher divided the students into groups and instructed them to work together, it would not have met her need for overt structure. The only directions the students were given was a recipe and they were required to complete the task themselves and expected to ask for any equipment or help they might need. The student appeared to enjoy the lesson, but during the oral post-test it was apparent that she was completely flustered. She found it difficult to focus her attention and when asked to point to the objects referred to by the

target words, she pointed randomly at objects in her immediate environment, such as her chair, most of which had no connection with the lesson.

However, despite poor performance on some of the post-tests, she performed perfectly on the tactile words, and very well on the kinaesthetic words in the final examination and it seems that even though the lack of structure in some of the lessons impaired her short-term recall and immediate performance, it did not prevent her from acquiring the vocabulary.

There was evidence during the final lesson of the intervention period, Control 7A, that this student had started to become a more active learner and take charge of her own language learning. During this lesson, the teacher showed the children a book which contained illustrations of the target vocabulary, with the corresponding words written underneath. After a few minutes of watching, and listening to the teacher point to and talk about the pictures, the researcher observed this normally very obedient child lean forward, begin to touch other pictures in the book and quietly say the words. She became totally oblivious to what the teacher was saying and doing, as she touched each picture in turn and read the words to herself. Many of these words were not target vocabulary but she pronounced all the words to herself correctly, and obtained a perfect score on the post-test. It seemed that what happened during this lesson, was that she discovered that she could read Bahasa Malaysia, just as she could read English, and realised that she did not actually need the teacher because she could obtain the information and structure she needed from the book.

Child C

a) Learning style profile

Order of perceptual preferences: Tactile(5), Auditory,(2), Kinaesthetic(1)/Visual(1).

This student indicated definite preferences on eight of the other eleven subscales of the LSI:P. She has a strong preference for a quiet, formal, brightly lit learning environment. She also prefers a cool temperature and to study in the afternoon. She does not require intake or mobility. She has no preference for structure or lack of structure and feels she is sometimes, but not always, responsible and persistent. She is teacher, self, and adult motivated and prefers to work with an adult or peers but not alone.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student responded positively to all statements and very positively to “My Bahasa Malaysia teacher thinks I am a good student.”

September: She responded positively to all statements except “Bahasa Malaysia is interesting.”

October: She responded very positively to “Bahasa Malaysia is very easy to learn.” and positively to all other statements, except “Bahasa Malaysia is interesting”.

c) Effect of the intervention

At the beginning of the intervention, this student’s performance on the pre-tests suggested that the amount and level of difficulty of the new vocabulary could be too demanding for her as she scored an average of 2/10 on each of the first 6 pre-tests. During the first three lessons, control lessons C1A and C1B and tactile lesson T2A, she acquired 1-3 words per lesson. However in the next control lesson, C2B she made a gain of 9 words. She made no gain in the next control lesson, C3A but acquired 2 words in the corresponding kinaesthetic lesson, K3B. From this point her performance improved markedly, either with good scores on the pretests in week 4, or by substantial gains on the post-tests in weeks 5,6 and 7.

She gained between 0-9 words per lesson in the control lessons, gaining an average of 3.2 words per lesson in the 8 control lessons. During the experimental lessons she

gained between 1-6 words per lesson, with an average gain of 3.3 words per lesson over the 6 lessons. During the Tactile lessons (matched for perceptual preference) the student gained 1-5 words per lesson, with an average gain of 3.3 words over the 3 lessons. However, she gained between 1-9 words in the corresponding control lessons, gaining an average of 5.5 words over the three lessons. During the three kinaesthetic lessons she gained 10 words, with an average of 3.3 words per lesson, compared with a total gain of 4 words over the corresponding control lessons.

In the final examination, she scored 10/10 in the oral test, and 35/40 on the written test, with 90% accuracy on the control and tactile words and 75% accuracy on the kinaesthetic words.

d) Comments

The intervention had a positive effect on this student. The increase in pre-test scores may indicate that her level of language competence increased over the period and perhaps this had a generalised effect on her language learning. However, the dramatic improvement in her performance after the third week could also simply indicate a change in her concentration and effort during Bahasa Malaysia lessons and during the pre- and post-tests. During the first week of the intervention, this student was observed to sit at the back and talk to Student A throughout the lesson. This behaviour confirmed the opinion she expressed in during the LSI:P interviews, that she did not consider herself to be particularly responsible and persistent. Furthermore both before and after the intervention she expressed disagreement with the statement "Bahasa Malaysia is interesting". Students with low persistence and reliability scores need lessons to be interesting and enjoyable, or to have some other type of motivation. Since this student continued to express the opinion that the language itself was not interesting, perhaps there were other features of the lessons which she enjoyed and which caused her to pay more attention. Another possible reason for the improvement in her performance is that during the LSI:P interviews she reported that she preferred to work with a teacher or with peers, but not alone. During the intervention period, both the control and experimental lessons involved a lot of interaction between the teacher and the students, and among the students. In fact, as the intervention progressed the children began to participate more and more actively during control

lessons. The high degree of social activity suited this student's sociological preferences and this may have been more important to her than perceptual preferences.

The student's tactile preference was not confirmed, with an overall gain of 10 words over the 3 tactile lessons compared with 17 words over the corresponding control lessons. The student performed better in two of the control lessons than in the corresponding tactile lessons. However, she performed substantially better in the kinaesthetic lessons than in the corresponding control lessons with a gain of 10 words over the three kinaesthetic lessons compared with 4 words in the corresponding control lessons. Furthermore she performed better in two of the kinaesthetic lessons than in the corresponding control lessons. This suggests that she was not actually aware of which perceptual modalities suited her language learning and that she might benefit from discussing her learning preferences again, with an awareness of her performance in the tactile and kinaesthetic lessons.

Child D

a) Learning style profile

Order of perceptual preferences Tactile(3),Kinaesthetic(3)/Auditory(2),Visual(1).

This student indicated definite preferences on eight of the eleven other subscales of the LSI:P. She strongly prefers a cool, well-lit, formal learning environment. She prefers that the learning environment is not quiet and likes to study in the morning. She feels strongly that she does not need to eat or drink, or move around while she is studying. She is teacher, adult and self motivated and strongly believes herself to be responsible and persistent. She prefers to work with adult or peers, but not alone.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student expressed uncertainty to "I think I am going to do well in Bahasa Malaysia" and "I can learn Bahasa Malaysia" and responded negatively to all other statements.

September: She responded negatively to "Bahasa Malaysia is easy to learn", "I am good at Bahasa Malaysia", "I like Bahasa Malaysia" and "I feel happy during Bahasa Malaysia lessons". She expressed uncertainty to, "Bahasa Malaysia is interesting", "I

enjoy learning Bahasa Malaysia ” and “My Bahasa Malaysia teacher thinks I am a good student”. She responded positively to “Bahasa Malaysia is a good language”, “I think I am going to do well in Bahasa Malaysia’ and “I can learn Bahasa Malaysia”.

October: She responded negatively to “I feel happy during Bahasa Malaysia lessons”. She expressed uncertainty at “I am good at Bahasa Malaysia” and “My Bahasa Malaysia teacher thinks I am a good student”. She agreed with all other statements and strongly agreed with “Bahasa Malaysia is easy to learn” and “I think I am going to do well in Bahasa Malaysia”.

c) Effect of intervention

At the beginning of the intervention, the amount and level of difficulty of the new vocabulary appeared to be too demanding for this student. She obtained an average of only 1/10 in the pre-tests during the first three weeks of the intervention. However, from the fourth week her pre-test results improved and averaged 4.5/10. She gained between 0-8 words per lesson in the control lessons, gaining an average of 3.7 words per lesson in the 8 control lessons. During the experimental lessons she gained between 0-4 words per lesson, with an average gain of 2 words per lesson over the 6 lessons. During the Tactile lessons (matched for perceptual preference) she gained 0-4 words per lesson with an average gain of 1.5 words over the 3 lessons. During the Kinaesthetic lessons (matched for perceptual preference) she gained an average of 2.5 words over the three lessons. By the end of the intervention, the amount and level of difficulty of the new vocabulary appeared to be at an appropriate level for this student.

In the final examination, she scored 10/10 in the oral test, and 33/40 on the written test, with 100% accuracy on the kinaesthetic words, 85% on the control words and 66% on the tactile words.

d) Comments

The intervention had a number of positive effects on this student. At the beginning of the intervention the very low pre-test scores indicated that she had minimal Bahasa Malaysia vocabulary. In the case of this student, the very low scores did not reflect a lack of attention or concentration. She was initially quite distressed by the level of difficulty of the tests, and in the first control lesson she did not want to pass back

either pre- or post-tests because she realised that she had not performed well. It was also difficult to retrieve the pre-test for the second control lesson from her before the lesson started because she had realised that she would be tested on those words again later and she wanted to keep the test in her hand so that she could refer to it throughout the lesson.

She worked very well throughout the intervention period, paying close attention to the teacher during control lessons, and completing as many activities as possible during the experimental lessons. For example, the class was always given a choice of worksheets to complete during the tactile lessons, but this student chose to complete all the worksheets, and if she couldn't finish them before the end of the lesson she took them home and returned them to the teacher the next day. It was also observed that she liked to move herself to the front of the group during control lessons so she could reach up and touch the pictures on the teacher's chart.

The degree of importance she gave to performing well in the tests, and her determination to learn the target vocabulary and complete all assigned tasks was very noticeable. Her behaviour confirmed her view of herself, expressed in the LSI(P) interview, as a highly motivated, responsible and persistent person.

The student's tactile and kinaesthetic preferences were not confirmed since she usually made greater gains in the control lessons than in the corresponding experimental lessons. However, this student who appeared to have a low level of initial Bahasa Malaysia competence, made good, or very good vocabulary gains in most of the lessons.

For the purposes of this study, this student was classified as having a joint Tactile/Kinaesthetic first preference. However, her learning style profile indicates that she has no strong perceptual preferences. When other versions of the Learning Style Inventory are used, this lack of strong preferences is usually interpreted as indicating that the student has no strong perceptual strengths. However, the forced choice nature of the LSI:P makes it impossible to distinguish between students who indicate no strong perceptual strengths, and students who can learn using any perceptual modality.

This student's consistently good performance during the intervention period, and her profile of 3,3,2,1 (with the lowest score representing the visual modality which may have been understated for most of the group) suggest that rather than not having any perceptual strengths, this student has a range of perceptual strengths and can adapt to different types of lessons.

The degree of success which this student experienced during the intervention period, in both experimental and control lessons, is not surprising given the effectiveness of her language learning skills and her high degree of motivation, responsibility and persistence. However, what is surprising is that she had learned very little during the previous one and a half years of Bahasa Malaysia lessons. This lack of previous success was reflected in her largely negative initial responses to the Language Learning Attitudes and Beliefs Questionnaire. Her feelings about Bahasa Malaysia, and herself as a language learner, were a little more positive by the time the intervention began, but she still felt that Bahasa Malaysia was difficult to learn, and that she was not good at it. She also did not like Bahasa Malaysia and felt unhappy during Bahasa Malaysia lessons. She was unsure whether her teacher thought she was a good student, whether Bahasa Malaysia was interesting, and whether she enjoyed learning it.

At the end of the intervention period, she still did not feel happy during Bahasa Malaysia lessons, and was unsure whether she was good at Bahasa Malaysia and whether her teacher thought she was a good student. However, she now liked Bahasa Malaysia, enjoyed learning it, and felt that it was interesting. She also strongly believed that Bahasa Malaysia was easy to learn and that she was going to do well in it.

Overall, the intervention had a very beneficial effect not only on this student's performance but on her confidence and attitudes to Bahasa Malaysia. It is possible that her feelings of unhappiness during Bahasa Malaysia lessons, and uncertainty about whether she was good at Bahasa Malaysia and whether her teacher thought she was a good student were related to each other, as during the LSI:P interview she reported that she was teacher motivated. Even though she was performing very well, perhaps she needed to be told that by the teacher.

Child E

a) *Learning style profile*

Order of perceptual preferences: Tactile(3)/Visual(3),Auditory(2),Kinaesthetic(1).

This student indicated definite preferences on five out of eleven other subscales of the LSI:P. She has a strong preference for a well-lit learning environment and does not need to eat or drink while studying. She also prefers a formal learning environment and does not need to move around while studying. She prefers to study in the afternoon. She likes to learn with an adult, peers, or alone. She feels that she is self and adult motivated, and sometimes also unmotivated, but definitely not teacher motivated. She also feels little need for structure.

b) *Responses to Language learning attitudes and beliefs questionnaire*

January: The student responded positively to the statement, “I can learn Bahasa Malaysia”. However, she expressed uncertainty about “Bahasa Malaysia is interesting”, “I enjoy learning Bahasa Malaysia”, “I think I am going to do well in Bahasa Malaysia lessons” and “My Bahasa Malaysia teacher thinks I am a good student”. She responded negatively to all other statements.

September: She responded negatively to “Bahasa Malaysia is easy to learn” and “I am good at Bahasa Malaysia”. She expressed uncertainty at “I can learn Bahasa Malaysia”, “My Bahasa Malaysia teacher thinks I am a good student” and responded positively to all other statements.

October: She responded positively to all statements except “I am good at Bahasa Malaysia”.

c) *Effect of intervention*

At the beginning of the intervention, the amount of new vocabulary to be acquired seemed to be rather high for this student. She obtained an average of less than 1/10 in the first three pre-tests. However, from the fourth lesson, her pre-test results improved and averaged 4/10 over the next four lessons, and rose to almost 6/10 over the final seven lessons. She gained between 0-7 words per lesson in the control lessons (matched for first perceptual preference), gaining an average of 3 words per lesson in the 8 control lessons. During the experimental lessons she gained between 0-7 words per lesson, with an average gain of 2.7 words per lesson over the 6 lessons. During the

Tactile lessons (matched for first perceptual preference) she gained 2-7 words per lesson with an average gain of 4.3 words over the 3 lessons. During the kinaesthetic lessons (unmatched), she gained between 0-3 words per lesson with an average gain of 1 word over the 3 lessons.

In the final examination, she scored 10/10 in the oral test, and 31/40 on the written test, with 85% accuracy on the control words and 92% accuracy on the tactile words and 37% accuracy on the kinaesthetic words.

d) Comments

The intervention was of overall benefit to this student. Her perceptual preferences were matched in both the tactile and control lessons, since tactile and visual were her joint first preferences. These preferences were confirmed by her performance in the control and tactile lessons. Her low preference for kinaesthetic learning activities was also confirmed by her poor performance in the kinaesthetic lessons. The only kinaesthetic lesson in which she gained vocabulary was the game lesson, K3B, which had a strong visual component. Furthermore, this student was the only one who failed to gain any vocabulary in the role play lesson, the only lesson in which the students did not have an opportunity not see the vocabulary in written form. Her final examination results also strongly confirmed both her tactile preference and weak kinaesthetic preference.

Child F

a) Learning style profile

Order of perceptual preference: Kinaesthetic(4),Tactile(2)/Auditory(2),Visual(1).

This student indicated definite preferences on seven out of eleven of the other subscales of the LSI:P. She strongly prefers a learning environment that is warm and not brightly lit. She also prefers a quiet learning environment and to study in the evening. She feels strongly that she does not need to move around while studying. She is strongly adult motivated and feels that she is responsible and persistent. She is also self motivated but not teacher motivated. She likes to work alone, with an adult or with peers. She feels little need for structure.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student had not yet joined the class.

September: Not available. However this student had expressed considerable anxiety about language learning and had cried during Bahasa Malaysia classes on a number of occasions.

October: She responded negatively to “Bahasa Malaysia is easy to learn” and she was uncertain about “My Bahasa Malaysia teacher thinks I am a good student”. She responded positively to all other statements and very positively to “I feel happy during Bahasa Malaysia lessons.”

c) Effect of intervention

At the beginning of the intervention, the amount and level of difficulty of the new vocabulary seemed to be too great for this student. She had experienced difficulty in matching words to pictures in the mid-year assessment and was able to spell correctly only 1/12 words tested. She obtained an average of less than 1/10 in the pre-tests during the first three weeks of the intervention. During the first week of the intervention she was observed to withdraw from the control lessons and move to the back of the room to read English books. She participated actively in the experimental lessons however, and began to show more interest during control lessons as her understanding and confidence increased. From the fourth week her pre-test results improved to an average of 3/10 for the remainder of the intervention period. She gained between 0-6 words per lesson in the control lessons, gaining an average of 2 words per lesson over the 8 control lessons. During the experimental lessons she gained between 1-8 words per lesson, with an average gain of 3 words per lesson over the 6 lessons.

During the Kinaesthetic lessons (matched for first perceptual preference) she gained 1-2 words per lesson with an average gain of 1.3 words over the 3 lessons. In the corresponding control lessons she gained 0-3 words per lesson with an average gain of 1 word per lesson. She performed better in two out of three Kinaesthetic lessons than in the corresponding control lessons. During the Tactile lessons, she gained 6-8 words per lesson, with an average gain of 7 words over two lessons, compared with an

average of 5.5 words in the corresponding control lessons.

In the final examination, she scored 10/10 in the oral test, and 67% on the written test, with 80% accuracy on the control words, 75% accuracy on the tactile words, and 25% accuracy on the kinaesthetic words.

d) Comments

This student clearly benefited from the intervention both in terms of improved vocabulary acquisition and increased confidence. During the final three weeks of the intervention her post-test score averaged 5.5/10 which indicated that the workload was probably still a little too difficult for her, but not nearly as difficult as it had been at the beginning of the intervention.

Her kinaesthetic preference was confirmed, although not strongly, by her slightly better performance in kinaesthetic lessons than in the corresponding control lessons. However, in the final examination her recognition of words introduced in kinaesthetic was poor, compared with recognition of words introduced in both tactile and control lessons. This suggests that for this student vocabulary acquired during kinaesthetic lessons may not be readily recalled in the long term when it is presented in written form, although it can be recalled in oral form.

This student also performed extremely well in Tactile lessons and it seems that she may have underestimated her tactile strengths. Given her poor performance in the period before the intervention, and her steady improvement throughout the intervention, it seems that the pre-intervention programme was not meeting her needs and that she required multisensory learning activities in order to begin to make progress. Towards the end of the intervention this student spontaneously informed the researcher that she was now doing well in Bahasa Malaysia. When asked to account for the improvement in her performance she explained that she had recently begun to talk with her amah (nanny) in Bahasa Malaysia. Based on the information in her learning style profile, it seems that she had spontaneously discovered the sort of unstructured, highly social, natural learning activity suited to her learning style. After the final test she thanked the researcher for “bringing all the things for us to play with in Bahasa Malaysia”.

Child G

a) Learning style profile

Order of perceptual preferences: Tactile(3)/Visual(3)/Auditory,(2),Kinaesthetic(1).

This student indicated definite preferences on six out of eleven of the other subscales of the LSI:P. She prefers to study in the afternoon, in a brightly-lit formal learning environment and feels strongly that she does not need to move around while learning. She does not need to eat or drink while studying. She likes to work alone or with peers, but not with an adult and feels strongly that she needs little structure. She is teacher, self and adult motivated.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student responded positively to all statements

September: No information available

October: She responded positively to “Bahasa Malaysia is interesting” and responded very positively to all other statements.

c) Effect of intervention

The amount and level of difficulty of the new vocabulary was clearly not at an appropriate level for this student, and it became apparent that she was a native speaker of the target language. She obtained perfect, or near perfect scores on all the pre-tests and therefore no effects could be obtained.

In the final examination, she scored 10/10 in the oral test, and 100% on the written test.

d) Comments

Although the intervention had little effect on this student’s vocabulary acquisition, it did increase her enjoyment of Bahasa Malaysia lessons. Towards the end of the intervention period she told the researcher. “I really love Bahasa Malaysia. It’s my favourite.”

Child H

a) Learning styles profile

Order of perceptual preference: Kinaesthetic(4),Tactile(3)/Visual(2),Auditory(0).

This student indicated definite preferences on 10 out of 11 of the other subscales of the LSI:P. She has a strong preference for a cool learning environment which is not brightly lit. She also feels strongly that she needs to move around and be able to eat and drink while studying. She prefers a quiet learning environment and likes to study in the morning or evening, but not in the afternoon. She has a strong preference for working alone and does not like to work with peers. She feels adult motivated but not particularly teacher or self motivated. She feels that she is responsible and persistent and feels strongly that she needs little structure.

b) Responses to Language learning attitudes and beliefs questionnaire

January: The student responded positively to all statements and responded very positively to “Bahasa Malaysia is easy to learn.”

September: She expressed uncertainty about “I am good at Bahasa Malaysia”, “I like Bahasa Malaysia” and “My Bahasa Malaysia teacher thinks I am a good student”. She responded positively to all other statements.

October: She expressed uncertainty about “I am good at Bahasa Malaysia”, “I think I am going to do well in Bahasa Malaysia” and “My Bahasa Malaysia teacher thinks that I am a good student”. She responded positively to all other statements.

c) Effect of intervention

At the beginning of the intervention, the amount and level of difficulty of the new vocabulary seemed to be appropriate for this student. She obtained an average of 3.5/10 in the pre-tests during the first three weeks of the intervention. This increased slightly to 4/10 over the remainder of the intervention period. She gained between 0-3 words per lesson in the control lessons, gaining an average of 1.2 words per lesson in the 8 control lessons. During the experimental lessons she gained between 0-4 words per lesson, with an average gain of 2 words per lesson over the 6 lessons. During the Kinaesthetic lessons (matched for first perceptual preference) she gained 2-4 words per lesson with an average gain of 3 words over the 3 lesson, compared with an average of

1 word per lesson over the corresponding control lessons. During the tactile lessons (matched for second perceptual preference) she gained between 0-2 words per lesson, with an average of 1 word per lesson, compared with an average of just over 1 word per lesson in the corresponding control lessons.

In the final examination, the student scored 10/10 in the oral test, and 18/40 on the written test, with 45% on the control words, 50% on the tactile words, and 37% on the kinaesthetic words.

d) Comments

The student's kinaesthetic preference was confirmed by her better performance during the kinaesthetic lessons than on the control and tactile lessons. However, she did not perform well on the kinaesthetic words in the final written examination although she recognised the kinaesthetic words as well as the control and tactile words on the oral component of the examination. This suggests that for this student, vocabulary acquired during kinaesthetic lessons may not be readily recalled in the long term when it is presented in written form, although it can be recalled in oral form.

This was the only student whose beliefs about her competence at learning Bahasa Malaysia become less positive as a result of the intervention. Her initial strong agreement that "Bahasa Malaysia is easy to learn" was probably a reflection of the lack of challenge in Bahasa Malaysia lessons during the first term. The beliefs expressed in September, probably reflected a more realistic assessment. However, at the conclusion of the intervention period this student was still uncertain as to whether she was good at Bahasa Malaysia and was now uncertain as to whether she would do well in it. She was also still not sure whether her teacher thought that she was a good student.

It is possible that the negative effect of the intervention on this student's beliefs was caused by the amount and level of difficulty of the target vocabulary. Whilst the level of difficulty appeared to be at a reasonable level, based on the pre-test results, and the student made moderate gains in each lesson, this student's performance did not improve as much as that of most of her classmates. This may have been discouraging to a student who had high expectations of her own performance. Furthermore, the final attitudes and beliefs interview was conducted immediately after the final examination in

which this student did not perform particularly well.

However, there may have been other reasons for this student to have become more pessimistic about learning Bahasa Malaysia. It is possible that some aspects of the change in learning environment during the intervention were not favourable to this student and affected both her performance and beliefs. There were several environmental elements present in the classroom which did not suit this student but were the same before the intervention period and during the control and experimental lessons, e.g. bright light and warm temperature. However, the lessons during the intervention period, especially the tactile lessons, were considerably noisier than the lessons before the intervention began which was contrary to her preference for a quiet learning environment.

Another difference between the lessons before the intervention period, and those during the intervention period involved sociological factors. Before the intervention the students spent most of their time either listening to the teacher, or working alone in individual workbooks. During the intervention period the students continued to listen to the teacher during control lessons, but they were more active and there was a lot of interaction between the teacher and the students, and among the students. During the Kinaesthetic lessons the children were required to work in groups and share learning materials. This was contrary to this student's preference for working alone. During the Tactile lessons it was possible for students to work alone, but some resources needed to be shared and the small room became quite noisy and crowded as students talked while they worked together and moved around to get resources. This student may have found the noise and interruptions from other students to be distracting.

Discussion of Case Studies

As expected, the children expressed a preference for tactile and kinaesthetic learning activities. They clearly enjoyed the experimental lessons and there was a marked increase in on-task behaviour and decrease in disruptive and inattentive behaviour. However, during the intervention period, the children also began to participate more in

the control lessons and in general, to take a more active role in their own language learning. In other words, there was a spread of effect from the experimental lessons to the control lessons.

None of the children had a weak preference for tactile activities and three children expressed definite or strong preferences for tactile activities. The tactile preference of one of these children, Child A, was strongly confirmed by comparison of her vocabulary gains in control and tactile lessons. The tactile preference of Child B was also confirmed, but not as strongly. However, the strong tactile preference of the third child, Child C, was not confirmed. This may have been due to lack of knowledge about her own learning style, or perhaps other aspects of her learning style may have had a more significant effect than her perceptual preferences.

Three of the children expressed weak kinaesthetic preferences. One of these children was a native speaker of the target language, and all her scores were so high that it was impossible to determine any effect. Of the other two children, one clearly did not perform well in kinaesthetic lessons, except in the lesson with a very strong visual element, Kinaesthetic 3A. The other child with a weak kinaesthetic preference actually performed very well in the kinaesthetic lessons. This may have been due either to a lack of self-knowledge of her learning style, or to the fact that this student expressed a strong tactile preference and the kinaesthetic lessons contained strong tactile elements.

Two children expressed definite kinaesthetic preferences. These preferences were confirmed by their superior performance in two out of three kinaesthetic lessons, as compared with the corresponding control lessons. However, both of these students performed poorly on the kinaesthetic section of the final examination. They also obtained two lowest overall scores in the final examination. The small number of students in this group does not justify generalisation, but these two kinaesthetic students had more difficulty than the other students in recalling words in written form, including words presented in kinaesthetic lessons. However, all the children, including the students with definite kinaesthetic preferences, had no problem recognising any of the words in the oral test, regardless of which lesson they had been presented in.

Another student expressed a moderate kinaesthetic/tactile joint first preference. Her first preferences were not confirmed by superior performance on the experimental lessons than on the control lessons. However, it appeared that this student could actually learn well using any perceptual modality.

Looking at individual performance in different lessons, it seems that perceptual preferences were not the only, or the most important, factors in many cases. It appears that different factors have varying degrees of importance for different children and manipulation of any individual factor may make a difference for some children, but not for all of them. What benefits a number of children, even the majority, e.g. group work, may actually disadvantage other children.

Chapter 5

Results of the Statistical Analysis

Introduction

Three types of information were used in the statistical analysis, the children's preference scores on the Perceptual subscale of the LSI:P; the results of the pre- and post-tests for each lesson; and the final examination results. The small number of children for whom the results were available for analysis precluded the possibility of using the parametric test of choice for this design, i.e. the analysis of variance with repeated measures. The results listed and described in this chapter are those obtained using the Mann-Witney U and Wilcoxon Signed Ranks tests using an exact p-value. An explanation of these tests and why they were used can be found above, in **Chapter 3**.

Results

a) Perceptual preferences

Perceptual preference profiles were created for each child based on individual responses to the nine questions on the Perception subscale of the Learning Style Inventory: Primary (Perrin, 1991). The strengths of the children's preferences for each of the four perceptual modalities, Tactile, Kinaesthetic, Auditory, and Visual are listed below in **Table 5.1**.

Table 5.1

Strength of Each Perceptual Preference of Individual Children According to the Learning Styles Inventory: Primary

Student	Strength of preference			
	Tactile	Kinaesthetic	Auditory	Visual
1	5	2	2	0
2	4	2	2	1
3	5	1	2	1
4	3	3	2	1
5	3	1	2	3
6	2	4	2	1
7	3	1	2	3
8	3	4	0	2

Key 5 = strong preference

4 = definite preference

3 } moderate preference

2 } = moderate preference

1 = weak preference

0 = no preference

Description and Comment

Of the eight students in the group, including the native speaker, two expressed strong tactile preferences, one expressed a definite tactile preference, three expressed moderate tactile preferences with these being co-preferenced as their first preference with kinaesthetic for one student and visual for two students. One student expressed a moderate tactile preference. None of the students expressed weak tactile preferences.

Two students expressed definite kinaesthetic preferences, while three students expressed moderate kinaesthetic preferences. Another three students expressed weak kinaesthetic preferences.

Seven students expressed moderate auditory preferences and only one expressed no auditory preference.

Three students expressed moderate visual preferences, with two of these students having this as their joint first preference along with tactile. These students would not necessarily be expected to perform better in the experimental conditions since they were always matched for first preference. However, they might be expected to perform better in tactile lessons because both their first preferences would be matched.

b) First (strongest) perceptual preferences

The first hypothesis was that the children would have either tactile or kinaesthetic first preferences. This hypothesis was strongly supported. The first (strongest) perceptual preference of each child was determined according to the perceptual preference profiles listed above in **Table 5.1**.

The numbers of children with a first preference for each perceptual modality is summarised below in **Table 5.2**. It should be noted that some children's first preference was a co-preference for two modalities.

Table 5.2

Summary of First Perceptual Preferences

First preference	Number of children
Tactile	3
Kinaesthetic	2
Tactile/kinaesthetic	1
Tactile/visual	2

Description and Comment

All of the children expressed a tactile or kinaesthetic first preference or joint first preference. The first hypothesis, that the children would have tactile or kinaesthetic first perceptual preferences was confirmed, however all but one of the children also expressed moderate auditory preferences. Two children also had a tactile/ visual first co-preference. This suggests that this children should also be able to attend to and retain a reasonable amount of information in the auditory/visual control lessons.

c) Class performance on vocabulary acquisition in individual experimental and control lessons.

In order to measure the amount of vocabulary gain the children made on individual lessons, the class was pre- and post-tested on target vocabulary recognition every lesson. The number of students who made gains, losses, or demonstrated no change, in vocabulary recognition during each of the fourteen lessons is listed below in **Table 5.3**.

Table 5.3

Comparison of Pre-and Post-Test Results of Vocabulary Instruction in Control and Experimental Lessons Over Seven Weeks Using the Wilcoxon Signed Ranks

Exact Test

Week	Lesson	Gain	Loss	Same	Significance (from Wilcoxon Signed Ranks Test)
1	Control 1A	6	0	2	.0169
	Control 1B	7	0	1	.0072
2	Tactile 2A	7	0	1	.0097
	Control 2B	7	0	1	.0087
3	Control 3A	1	2	4	.6196
	Kinaesthetic 3B	7	0	1	.0089
4	Tactile 4A	5	0	2	.0310
	Control 4B	2	3	3	.6233
5	Control 5A	7	0	1	.0073
	Tactile 5B	6	0	2	.0164
6	Kinaesthetic 6A	6	1	1	.0497
	Control 6B	2	1	5	.4998
7	Control 7A	7	0	1	.0077
	Kinaesthetic 7B	6	0	2	.0155

Description and comment

In the first week there were two control lessons. After the first lesson Control 1A, six children performed better in the post-test than they had done in the pre-test, while two children obtained the same score on the two tests. In the second lesson of the week, seven

children performed better in the post-test than they had done in the pre-test, while one child obtained the same score on the two tests.

In the second week there was one experimental tactile lesson and one control lesson. After the tactile lesson, Tactile 2A, seven children performed better in the post-test than they had done in the pre-test, while one child obtained the same score on the two tests. In the second lesson of the week, Control 2B, seven children performed better in the post-test than they had done in the pre-test, while one child obtained the same score on the two tests.

In the third week there was one control lesson and one experimental kinaesthetic lesson. After the control lesson, Control 3A, one child performed better in the post-test than she had done in the pre-test, two children obtained lower scores in the post-test than they had done in the pre-test, and four children obtained the same score on the two tests. In the second lesson of the week, Kinaesthetic 3B, seven children performed better in the post-test than they had done in the pre-test, while one child obtained the same score on the two tests.

In the fourth week there was one experimental tactile lesson and one control lesson. After the tactile lesson, Tactile 4A, five children performed better in the post-test than they had done in the pre-test, and four children obtained the same score on the two tests. In the second lesson of the week, Control 4B, two children performed better in the post-test than they had done in the pre-test, while three children obtained lower scores on the post-test than they had done on the pre-test, and three children obtained the same score on the two tests.

In the fifth week there was one control lesson and one experimental kinaesthetic lesson. After the control lesson, Control 5A, seven children performed better in the post-test than they had done in the pre-test, and one child obtained the same score on the two tests. In the second lesson of the week, Tactile 5B, six children performed better in the post-test than they had done in the pre-test, while two children obtained the same score on the two tests.

In the sixth week there was one experimental kinaesthetic lesson and one control lesson. After the kinaesthetic lesson, Kinaesthetic 6A, six children performed better in the post-test than they had done in the pre-test, while three children obtained lower scores on the post-test than they had done on the pre-test, and one child obtained the same score on the two

tests. In the second lesson of the week, Control 6B, two children performed better in the post-test than they had done in the pre-test, while three children obtained lower scores on the post-test than they had done on the pre-test , and five children obtained the same score on the two tests.

In the seventh week there was one control lesson and one experimental kinaesthetic lesson. After the control lesson, Control 7A, seven children performed better in the post-test than they had done in the pre-test, and one child obtained the same score on the two tests. In the second lesson of the week, Kinaesthetic 7B, six children performed better in the post-test than they had done in the pre-test, and two children obtained the same score on the two tests.

The class as a whole made statistically significant gains in vocabulary recognition in all lessons, except the control lessons in weeks three, four, and six.

d) Comparison of class performance on experimental and control lessons

The second hypothesis was that the traditional auditory/visual teaching methods would be less effective than tactile and kinaesthetic teaching methods for the class as a whole. This hypothesis was partially supported. In order to test this hypothesis, the number of children who made gains, losses, or demonstrated no change in each control lesson was compared with the number of children who made gains, losses, or no change in the matching experimental lesson in the same week.

The comparisons for each week are listed below in **Table 5.4**.

Table 5.4

Comparison of Vocabulary Learning Gains in Experimental Tactile or Kinaesthetic and Control Lessons Using the Wilcoxon Signed Ranks Exact Test

Week	Lessons	Greater gain on exp lesson	Less gain on exp lesson	Same gain on each lesson	Significance (from Wilcoxon Signed Ranks Test)
1	Control 1A/Control 1B	3	3	2	.6015
2	Tactile 2A/Control 2B	3	4	1	.4373
3	Control 3A/Kinaesthetic 3B	6	0	1	.0157
4	Tactile 4A/Control 4B	5	1	1	.0633
5	Control 5A/Tactile 5B	1	5	2	.0440
6	Kinaesthetic 6A/Control 6B	6	2	0	.0389
7	Control 7A/Kinaesthetic 7B	0	6	2	.0141

Description

In the first week there were two control lessons. Three children made greater vocabulary gains in the first control lesson, Control 1A, while three children made greater vocabulary gains in the second control lesson, Control 1B, and two children made the same amount of gain in each lesson. The difference was not significant.

In the second week there was one experimental tactile lesson and one control lesson. Four children made greater vocabulary gains in the tactile lesson, Tactile 2A, while three children made greater vocabulary gains in the control lesson, Control 2B, and one child made the same amount of gain in each lesson. The difference was not significant.

In the third week there was one control lesson and one experimental kinaesthetic lesson. None of the children made greater vocabulary gains in the control lesson, Control 3A, while six children made greater vocabulary gains in the kinaesthetic lesson, Kinaesthetic 3B, and

one children made the same amount of gain in each lesson. The difference was significant at $p=.0157$

In the fourth week there was one experimental tactile lesson and one control lesson. Five children made greater vocabulary gains in the tactile lesson, Tactile 4A, while one child made greater vocabulary gains in the control lesson, Control 4B, and one child made the same amount of gain in each lesson. The difference was very nearly significant at $p=.0633$.

In the fifth week there was one control lesson and one experimental tactile lesson. Five children made greater vocabulary gains in the control lesson, Control 5B, while one child made greater vocabulary gains in the tactile lesson, Tactile 5A, and two children made the same amount of gain in each lesson. The difference was significant at $p=.0440$.

In the sixth week there was one experimental kinaesthetic lesson and one control lesson. Six children made greater vocabulary gains in the kinaesthetic lesson, Kinaesthetic 6A, while two children made greater vocabulary gains in the control lesson, Control 6B. The difference was significant at $p=.0389$.

In the seventh week there was one control lesson and one kinaesthetic lesson. Six children made greater vocabulary gains in the control lesson, Control 7A, while two children made the same amount of gain in each lesson. The difference was significant at $p=.0141$.

Comment

Statistically significant results were obtained between performances in all three kinaesthetic and corresponding control lessons. In weeks three and six, the class as a whole performed substantially better in the kinaesthetic lessons. In week seven, the class as a whole performed better in the control lesson. It appears that the kinaesthetic lessons had a similar effect on the whole group, for better or for worse.

There was no significant difference between the group's performances on the two

control lessons during week one. This indicates that the vocabulary was of a similar level of difficulty, and there was no apparent effect of lesson order, i.e. the group's performing better in either the first or second lesson of the week.

Statistically significant differences were obtained between performances in only one of the three tactile lessons and the corresponding control lesson, although this would be two if the $p=.0633$ were to be accepted. In week five, the group as a whole performed significantly better on the control lesson than on the tactile lesson.

However, in week six there was a near significant difference in favour of tactile lessons between the performance in the control and tactile lessons. In week two, there was no difference between the performance on the two lessons. It appears that the tactile lessons did not have as uniform an effect as the kinaesthetic lessons.

Ranks of gain and decrease in learning across control and experimental lessons differed in favour of the experimental conditions in only four out of six comparisons (including a $p= .0633$ as very near conventional significance level). These effects were found in comparison of three tactile lessons with three control lessons, and three kinaesthetic lessons with three control lessons.

e) Comparison of vocabulary gains in each lesson, according to group by strength of perceptual preference

The third hypothesis was that the use of tactile learning materials would be more effective than the traditional auditory/visual teaching methods for those children with strong tactile preferences. The fourth hypothesis was that the use of kinaesthetic learning activities would be more effective than the traditional auditory/visual teaching methods for those children with strong kinaesthetic preferences. The third and fourth hypotheses were not supported.

In order to test these two hypotheses, individual vocabulary gain results were aggregated into groups according to strengths of perceptual preference of each child.

The preferences were coded and recoded in a number of ways to determine whether there were any statistically significant relationships between strength of perceptual preferences and performance in each lesson or condition. For each lesson, the results of children with strong or weak preferences for particular modalities were compared with the results of children with different strengths of preference for that modality. No analysis was possible for Auditory preference because almost all the children expressed the same strength of preference for this modality.

All relationships with a p value of less than .20 are listed below in **Tables 5.5 - 5.11**. These results have been broken up into seven separate tables, one for each week, for ease of reference and comment but each table is part of the same analysis. The statements made about the number of gains do not presume statistical significance but they may provide interpretable tendencies.

Table 5.5

Comparison of Vocabulary Learning Gains in Initial Control Lessons According to Group by Strength of Perceptual Preference Using the Mann -Whitney U

Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
C1A/by V group 1 V pref=0,1,2 2 V pref=3	3.50	7.00	21.0	7.00	.1399
C1A/by T group 1 T pref=2, 2 T pref=3,4,5	1.00	4.50	1.00	27.0	.1444
C1A/by K group 1 K pref=1 2 K pref=2,3,4	5.50	3.40	11.0	17.0	.1916
C1A/by K group 1 K pref=1,2 2 K pref=3,4	5.00	2.67	20.0	8.00	.1183
C1B/by T group 1 T pref=2,3,4 2 T pref=5	4.80	2.00	24.0	4.00	.1418
C1B/by V group 1 V pref=0 2 V pref=1,2,3	1.00	4.50	1.00	27.0	.1419

Description

In the first control lesson, C1A the student with the strongest visual preference made the greatest vocabulary gain. The student with the weakest tactile preference made the least gain. The students with weaker kinaesthetic preferences made greater gains in this control lesson than the students with stronger kinaesthetic preferences.

In the second control lesson, C1B, the students with strong tactile preferences made less vocabulary gains than the students with less strong tactile preferences. The student with the weakest visual preference made the least vocabulary gain.

Table 5.6

Comparison of Vocabulary Learning Gains in Experimental Tactile and Control Lessons According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
T2A/by T group 1 Tactile=2, 2 Tactile=3,4,5	7.00	3.50	7.00	21.0	.1434
C2B/by K group 1 K pref=1 2 K pref=2,3,4	5.50	3.40	11.0	17.0	.1863

Description

In the first lesson of the week, a tactile lesson, the student with the weakest tactile preference made the greatest vocabulary gain. In the second lesson, the corresponding control lesson, the students with the weakest kinaesthetic preferences made greater gains than the students with stronger kinaesthetic preferences.

Table 5.7

Comparison of Vocabulary Learning Gains in Experimental Kinaesthetic and Control Lessons According to Group by Strength of Perceptual Preference
Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
C3A/by V group 1 Visual=0 2 Visual=1,2,3	6.00	3.00	6.00	15.0	.1727
K3B/by T group 1 Tactile=2 2 Tactile=3, 4,5	1.00	4.50	1.00	27.0	.1409
K3B/by T group 1 Tactile=2,3 2 Tactile=4,5	3.13	5.17	12.5	15.5	.1466
K3B/by K group 1 K pref=1,2 2 K pref=3,4	5.00	2.67	20.0	8.00	.1391

Description

In the first lesson of the week, control lesson C3A, the student with the weakest visual preference made greater gains than most of the students with stronger visual preferences. In the second lesson, kinaesthetic lesson K3B, the student with the weakest tactile preference made the least vocabulary gains and the students with moderate tactile preferences made less gains than the students with definite or strong tactile preferences. The students with weaker kinaesthetic preferences made greater gains than the students with stronger preferences.

Table 5.8

Comparison of Vocabulary Learning Gains in Control Lesson According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
C4B/by V group 1 Visual=0,1 2 Visual=2,3	4.80	2.00	24.0	4.00	.1364
C4B/by T group 1 Tactile=2,3 2 Tactile=4,5	3.25	5.00	13.0	15.0	.1930

Description

In the control lesson, C4B, the students with weaker visual preferences made greater vocabulary gains than the students with stronger visual preferences. The students with stronger tactile preferences made greater gains than the students with moderate tactile preferences.

Table 5.9

Comparison of Vocabulary Learning Gains in Experimental Tactile and Control Lessons According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
C5A/by V group 1 Visual=0,1 2 Visual=2,3	4.70	2.25	23.5	4.50	.1392
T5B/by T group 1 Tactile =2 2 Tactile = 3,4,5	7.00	3.50	7.00	21.0	.1434

Description

In the first lesson of the week, control lesson C5A, the students with weaker visual preferences made greater vocabulary gains than the students with moderate visual preferences. In the second lesson, tactile lesson T5B the student with the weakest tactile preference made greater vocabulary gains than the students with stronger tactile preferences.

Table 5.10

Comparison of Vocabulary Learning Gains in Experimental Kinaesthetic Lesson According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
K6A/by T group 1 Tactile =2,3,4 2 Tactile = 5	3.00	6.5	15.0	13.0	.0455

Description

In the kinaesthetic lesson, K6A, the students with the strongest tactile preferences made the greatest vocabulary gains. This result was significant at $p = .0455$.

Table 5.11

Comparison of Vocabulary Learning Gains in Experimental Kinaesthetic and Control Lessons According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
C7A/by V group 1 Visual=0,1, 2 Visual=2,3	4.60	2.50	23.0	5.00	.1895
C7A/by V group 1 Visual=0,1,2 2 Visual=3	4.50	1.00	27.0	1.00	.1416
C7A/by T group 1.Tactile =2,3 2.Tactile=4,5	2.75	5.67	11.0	17.0	.0867
K7B/by V group 1 Visual=0,1,2 2 Visual=3	4.50	1.00	27.0	1.00	.1420
K7B/by V group 1 Visual=0 2 Visual=1,2,3	7.00	3.50	7.00	21.0	.1413
K7B/by T group 1 Tactile=2,3,4 2 Tactile=5	3.20	6.00	16.0	12.0	.1453

Description

In the first lesson of the week, control lesson C7A, the student with the strongest visual preference made the least vocabulary gain. The students with the weakest visual preferences made greater vocabulary gains than the students with moderate visual preferences. Students with stronger tactile preferences made greater gains than students with moderate tactile preferences.

In the second lesson of the week, kinaesthetic lesson K7B, the student with the strongest visual preference made less vocabulary gain than the students with weaker visual preferences. The student with the weakest visual preference made the greatest

vocabulary gain. The students with the strongest tactile preferences made the greatest vocabulary gains.

Comment

The only relationship with a p value of less than .05 was that between strong tactile preference and vocabulary gain in the kinaesthetic lesson K6A. Although theoretically this was not a matched condition, it is not difficult to understand why a cooking lesson was congenial to students with strong tactile preferences.

f) Comparison of vocabulary gains between lessons within the same week, according to group by strength of perceptual preference

The fifth hypothesis was that the children would perform better when the instructional method matched their perceptual preferences than when it did not match their preferences. This hypothesis was not supported.

There were two lessons each week. Apart from the first week, which had two control lessons, there was one control lesson and one experimental lesson each week. Since vocabulary was randomly assigned between the control and experimental lessons, wherever possible, it is reasonable to assume that the vocabulary of control and experimental lessons within a week was of similar difficulty. Therefore, it is possible to compare directly the children's performance on experimental and control lessons within each week.

Individual vocabulary gain results were aggregated into groups according to strengths of perceptual preference of each child. The preferences were coded and recoded in a number of ways to determine whether there were any statistically significant relationships between strength of perceptual preferences and performance in each lesson or condition. For each lesson, the results of children with strong or weak preferences for particular modalities were compared with the results of children with different strengths of preference for that modality. No analysis was possible for Auditory preference because almost all the children expressed the same strength of preference for this modality.

All relationships with a p value of less than .20 are listed below in **Tables 5.12- 5.14**. These results have been broken up into three separate tables, one for lesson type, for ease of reference and comment but each table is part of the same analysis. The statements made about the number of gains do not presume statistical significance but may provide interpretable tendencies.

Table 5.12

**Comparison of Vocabulary Learning Gains Between Initial Control Lessons
According to Group by Strength of Perceptual Preference Using the Mann-
Whitney U Exact Test**

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
Con1/by V group 1 Visual=0 2 Visual=1,2,3	1.00	4.50	1.00	27.0	.1485
Con1/by T group 1 Tactile=2 2 Tactile=3,4,5	7.00	3.50	7.00	21.0	.1434
Con1/by T group 1 Tactile=2,3 2 Tactile=4,5	5.00	2.67	20.0	8.00	.1369
Con1/by T group 1 Tactile=2,3,4 2 Tactile=5	4.90	1.75	24.5	3.50	.0966
Con1/by K group 1 K pref=1 2 K pref=2,3,4	2.50	4.60	5.00	23.0	.1444
Con1/by K group 1 K pref=1,2 2 K pref=3,4	2.63	5.83	10.5	17.5	.0589
Con1/by K group 1 K pref=1,2,3 2 K pref=4	3.00	6.50	15.0	13.0	.0512

Description

The student with the weakest visual preference made the least increase in vocabulary gain between C1A and C1B, the first and second control lessons. The student with the weakest tactile preference made the greatest gain between the first and second lessons. The students with stronger tactile preferences made less gain between the lessons than the students with moderate tactile preferences. The students with the strongest tactile preferences made the least gains between the lessons. The students with the weakest kinaesthetic preferences made the least gain between the lessons. The students with the strongest kinaesthetic preferences made the greatest gain between lessons. This result was nearly significant at $p=.0512$.

Table 5.13

Comparison of Vocabulary Learning Gains Between Experimental Tactile Lessons and Control Lessons According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
Tac1/by T group 1 Tactile=2 2 Tactile=3,4,5	7.00	3.50	7.00	21.0	.1434
Tac2/by V group 1 Visual=0,1 2 Visual=2,3	2.75	5.00	11.0	10.0	.1334
Tac2/by V group 1 Visual=0,1,2 2 Visual=3	3.00	6.00	15.0	6.00	.1660
Tac3/by T group 1 Tactile=2 2 Tactile=3,4,5	7.00	3.50	7.00	21.0	.1398

Description

In the first comparison of gains made in control and tactile lessons, between the control lesson C2B and tactile lesson T2A, the student with the weakest tactile preference made the greatest gain. In the second comparison of gains made in control and experimental lessons, T4A and C4B, students with moderate visual preferences made a comparatively greater gain in the tactile lesson than in the control lesson as compared with students with weak visual preferences. The student with the strongest visual preference made a greater gain on the tactile lesson/control lesson difference than most of the other students. In the third comparison of gains made in control and tactile lessons, C5A and T5B, the student with the weakest tactile preference made the greatest gain.

Table 5.14

Comparison of Vocabulary Learning Gains Between Experimental Kinaesthetic Lessons and Control Lessons According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Lesson/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
Kin2/by T group 1 Tactile=2,3,4 2 Tactile=5	3.20	6.00	16.0	12.0	.1402
Kin3/by V group 1 Visual=0 2 Visual=1,2,3	7.00	3.50	7.00	21.0	.1413

Description

In the second comparison of gains made in control and kinaesthetic lessons, between the kinaesthetic lesson K6A and control lesson C6B, the students with the strongest tactile preference made the greatest gains in the experimental lesson over the control lesson. In the third comparison of gains made in control and kinaesthetic lessons, between C7A and K7B, the student with the weakest visual preference made the greatest gains in the experimental lesson over the control lesson.

Comment

There were no relationships with a p value of less than .05. The only comparisons which were close to this level were related to the performance of the children with moderate to strong kinaesthetic preferences on the two control lessons in Week 1. The children with the stronger kinaesthetic preferences made comparatively greater gains on the second control lesson than they did on the first control lesson, as compared with the other children ($p = .0589$). The relationship was slightly stronger for the two children with the strongest kinaesthetic preferences ($p = .0512$).

g) Comparison of overall vocabulary gains in Control, Tactile and Kinaesthetic lessons, as measured by performance on the final examination, according to group by strength of perceptual preference

The pre-and post-testing enabled comparison of the short-term vocabulary gains of different groups of children in each control and experimental lesson. However, long-term language gains are of more interest to language teachers, since it is only vocabulary which is recalled in the long-term that can be truly said to have been acquired. Therefore, at the conclusion of the examination, the children were tested for recognition of a randomly selected sample of half of all the target words which had been introduced during the first six weeks of the intervention.

Individual final examination results were aggregated into groups according to strengths of perceptual preference of each child. The preferences were coded and recoded in a number of ways to determine whether there were any statistically significant relationships between strength of perceptual preferences and performance on recognition of vocabulary introduced in control, tactile, and kinaesthetic words. For each group of words, the results of children with strong or weak preferences for particular modalities were compared with the results of children with different strengths of preference for that modality. No analysis was possible for Auditory preference because almost all the children expressed the same strength of preference for this modality. A separate oral test was also conducted, but since all the children recognised all the target vocabulary in this test there was no difference attributable to perceptual preferences.

All relationships with a p value of less than .20 are listed below in **Tables 5.15- 5.17**. These results have been broken up into three separate tables, one group of words, for ease of reference and comment but each table is part of the same analysis. The statements made about the number of gains do not presume statistical significance but may provide interpretable tendencies.

Table 5.15

Comparison of Vocabulary Learning Gains On Words Taught in Control Lessons, as Measured by Performance in the Final Examination, According to Group by Strength of Perceptual Preference Using Mann-Whitney U Exact Test

Final test/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
C Final/by K group 1 K pref=1,2 2 K pref=3,4	5.38	2.17	21.5	6.50	.0544
C Final/by K group 1 K pref=1,2,3 2 K pref= 4	5.00	1.5	25.0	3.00	.0458
C Final/by V group 1 V pref=0 2 V pref=1,2,3	7.00	3.50	7.00	21.0	.1436
C Final/by V group 1 V pref=0,1 2 V pref=2,3	4.70	2.25	23.5	4.50	.1400

Description

In the final test of words which had been presented in control lessons, the students with stronger kinaesthetic preferences recalled less vocabulary than the students with weaker kinaesthetic preferences. The two students with definite kinaesthetic preferences recalled least of the control words. This result was significant at $p=.0458$. The student with the weakest visual preference recalled more of the control words than the other students. The students with moderate visual preferences recalled fewer of the control words than the students with weak visual preferences.

Table 5.16

Comparison of Vocabulary Learning Gains On Words Taught in Tactile Lessons, as Measured by Performance in the Final Examination, According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Final test/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
T final/by K group 1 K pref=1,2 2 K pref=3,4	5.50	2.00	22.0	6.00	.0249
T final/by K group 1 K pref=1,2,3 2 K pref=4	4.80	2.00	24.0	4.00	.0940

Description

In the final test of words which had been presented in tactile lessons, the students with weaker kinaesthetic preferences recalled more of the words than the students with stronger kinaesthetic preferences. This result was significant at $p = .0249$. The students with definite kinaesthetic preferences recalled fewer of the words than the students with moderate or weak kinaesthetic preferences.

Table 5.17

Comparison of Vocabulary Learning Gains On Words Taught in Kinaesthetic Lessons, as Measured by Performance in the Final Examination, According to Group by Strength of Perceptual Preference Using the Mann-Whitney U Exact Test

Final test/group by strength of preference	Mean Rank		Sum of Ranks		p (from the Mann-Whitney U Test)
	Group1	Group2	Group 1	Group 2	
K final/by T group 1 T pref=2,3 2 T pref=4,5	3.25	5.00	13.0	15.0	.1697
K final/by T group 1 T pref=2 2 T pref=3,4,5	1.00	4.50	1.00	27.0	.1404
K final/by V group 1 V pref=0,1 2 V pref=2,3	4.60	2.50	23.0	5.00	.1924
K final/by K group 1 K pref=1,2,3 2 K pref=4	4.90	1.75	24.5	3.50	.0976

Description

In the final test of words which had been presented in kinaesthetic lessons, the students with stronger tactile preferences recalled more of the words than the students with weaker tactile preferences. The students with weak visual preferences recalled more of the words than the students with moderate visual preferences. The students with definite kinaesthetic preferences recalled fewer of the words than the other students.

Comment

Only two relationships were found which had a p value of less than .05. Both of these were related to the performance of the children with moderate or definite kinaesthetic preferences. The two children with definite kinaesthetic preferences did not perform as well on the control words in the final examination as the other children ($p = .0458$). The three children with moderate or definite kinaesthetic preferences did not perform as

well as the other children on the tactile words in the final examination ($p = .0249$). This may reflect the fact that two of the children had much lower initial levels of Bahasa Malaysia vocabulary than the other students.

Discussion of the Results of the Statistical Analysis

The results of the LSI:P interviews confirmed the first hypothesis that the children would have either tactile or kinaesthetic first preferences. Unexpectedly however, all but one of the children also had moderate auditory preferences, and several had moderate visual preferences as joint first preferences. Therefore, this group of students would not be expected to be particularly disadvantaged by the conditions in the auditory/visual control lessons and neither would large differences in gain scores between control and experimental lessons be expected.

The group as a whole made significant gains in vocabulary in all lessons except in control lessons, C3A, C4B, and C6B. This indicates that the group as a whole was not disadvantaged by the experimental lessons. The lack of gain in some of the control lessons was not surprising, given that a number of the children had made little progress in Bahasa Malaysia in the period prior to the intervention.

Comparison of gains made in control and experimental lessons within each week showed that the kinaesthetic lessons resulted in more gains than the corresponding control lessons on two out of three occasions. Only one tactile lesson produced greater gain than the corresponding control lesson. In another tactile/control comparison (T4A and C4B) substantially more of the students made gains on the experimental lesson than on the control lesson but the magnitude of the gains were not great enough to produce significant results. The modest result in favour of experimental lessons is not surprising, given the strength of the group's auditory and visual preferences. The second hypothesis, that the traditional auditory/visual teaching methods would be less effective than tactile and kinaesthetic teaching methods for the class as a whole was supported but not strongly confirmed.

The statistical analysis failed to show that students with stronger tactile preferences performed better than the other students during tactile lessons. Therefore, the third hypothesis that the use of tactile learning materials would be more effective than the traditional auditory/visual teaching methods for those children with stronger tactile preferences was not supported.

The statistical analysis also failed to show that students with stronger kinaesthetic preferences performed better than the other students during kinaesthetic lessons. Therefore, the fourth hypothesis that the use of kinaesthetic learning activities would be more effective than the traditional auditory/visual teaching methods for those children with stronger kinaesthetic preferences was not supported.

Comparison of performance on matched and unmatched conditions was very difficult, due to the small number of children for whom results were available. The use of such a small group precluded the use of analysis of variance using repeated measures. There were also few significant results using the Wilcoxon Signed Ranks and Mann-Whitney U Exact Tests. The Wilcoxon test can be used with very small groups, but since it takes into consideration the magnitude of a relation, as well as the direction, it is possible that large gains made by a few students in unmatched conditions could have counterbalanced more moderate gains by other students in matched conditions. Only examination of individual cases can determine whether this effect actually occurred. The statistical analysis failed to show that the children made greater vocabulary gains when the strengths of their learning styles were matched with their performance on matched conditions. Therefore, the fifth hypothesis that the children would perform better when the instructional method matched their perceptual preferences than when it did not match their preferences was not confirmed.

The only results related to individual performance on matched and unmatched conditions which had a p value of less than .05 were related to the performance of students with strong tactile preferences on the cooking lesson, K6A, and to the performance on the final examination of students with moderate to definite kinaesthetic preferences. The strongly tactile students made greater gains on the cooking lesson

than the other students. This is not surprising since cooking is a highly tactile, as well as kinaesthetic activity.

The results of the final examination showed that the two students with stronger kinaesthetic preferences (**Case studies F and H**) did not perform as well as the students with weaker kinaesthetic preferences. However, it would be unwise to make any generalisations about students with definite kinaesthetic preferences since the number of students involved was so small.

All other relationships with a p value of less than .20 were included for interest. A number of these results probably have little meaning since they referred to only a few children and may have happened by chance. The only way it is possible to determine whether these non-significant but interesting relationships actually have any meaning is by reference to the case studies for information about individual characteristics and performances.

Chapter 6

Unification of quantitative and qualitative information

The results of the quantitative analysis are more easily understood when considered in conjunction with the qualitative information provided in the case studies. The intention of this chapter is to consider the overall picture that is provided by both sets of information.

As predicted, the children reported a preference for tactile and kinaesthetic learning activities. This does not mean that they reported enjoying these activities, but rather that they expressed the belief that they could learn best using tactile and kinaesthetic perceptual modalities. The finding that the children had tactile and kinaesthetic first preferences was in accord with the findings of a number of studies involving young children from the United States of America.

However, two of the children (**Case studies E and G**) also expressed a visual co-first preference and all of the children expressed moderate auditory and/or visual preferences. This pattern of preferences could appear surprising, especially the moderate auditory preferences expressed by such young children. However, these children were nearing the end of the third year of kindergarten, and had been receiving rather formal instruction for the previous two years. They had considerable experience in using their visual and auditory modalities in the context of formal classroom instruction. Furthermore, these children were achieving well in most areas of the curriculum and had high expectations of academic success. It is possible that the highly enriched environment in which these children were growing up and receiving their education had contributed to the development of their perceptual strengths. Cultural factors may also have contributed to the early development of auditory and visual preferences, since the cultures of their families and society hold literacy, and the ability to learn by watching and listening, in high esteem.

The majority of the children proved to be very competent language learners however by final stages of the intervention they were not demonstrating as much vocabulary gain as they had earlier in the intervention. This does not mean that they were learning less, but rather that the pre- and post-testing was capable of identifying gains on only the target vocabulary. A number of the children (**Case studies A, B, E, G**) appeared to be capable of learning a greater number of words than the ten which were being presented as target vocabulary each lesson but the experimental design did not take this possibility into account. It was not possible to measure acquisition of other than target words. It may have been possible to increase the number of target words but it was decided that increasing the number of words to be taught and formally tested would be too stressful for some the other children. As the intervention progressed, a ceiling effect seemed to be evident for a number of the children (**Case studies A, B, E, G**) in that it was not possible for them to continue to demonstrate large gains in vocabulary. In other words, increases in pre-test scores precluded the possibility of sizeable gains on the post-tests.

The results of pre- and post testing showed a small advantage in favour of the experimental conditions over the control conditions. The lack of clear advantage of the tactile and kinaesthetic lessons is not surprising, given that the children all had moderate auditory and/or visual preferences. Several other reasons may have also contributed to the lack of a substantial difference between performance on the experimental and control conditions. Firstly, as mentioned above, it became increasingly difficult to gain large effects because many of the children had begun to perform well in the pre-tests. These children also began to perform consistently well in most lessons, regardless of lesson type. Possible explanations for this happy occurrence can be found in the case study information. After experiencing the experimental conditions, a number of the children started to become much more active in the control lessons (**Case studies B, C, D, F**). There appeared to be a transfer of both behaviour and effect from the experimental to the control lessons. Another possible explanation is related to the general improvement of the children's language learning attitudes and beliefs which occurred over the course of the intervention. It is possible that the

improved attitudes and beliefs were both a cause and effect of the improved performance. It is also possible that the improvement in attitudes and beliefs resulted in increased second language acquisition in natural settings outside the classroom (**Case study F**).

Since all of the children expressed at least moderate tactile preferences it is not surprising that there was no statistically significant difference between the performance on the tactile condition of the children with strong tactile preferences and those with less strong tactile preferences. The case study information indicates that strength of tactile preference was important for several of the strongly tactile children (**Case studies A and B**). It was also apparent however, that the child who expressed the lowest tactile preference could actually learn very effectively using this modality (**Case study F**). The finding that all of the children could learn effectively using the tactile modality is consistent with previous research findings which have found that young children are primarily tactile and kinaesthetic learners (Crino, 1984; LeClair, 1986; Keefe, 1982; Price, 1980, cited in Dunn et al., 1994, p. 17).

Statistically significant differences in performance were also not found between the performance on the kinaesthetic condition of children with stronger kinaesthetic preferences and those with less strong kinaesthetic preferences. The case study information does show that the two children with definite kinaesthetic preferences (**Case studies F and H**) performed better during kinaesthetic lessons than during the corresponding control lessons, with the exception of the final kinaesthetic lesson. One student had a kinaesthetic/tactual first preference (**Case study D**). She did not perform better in the experimental conditions than the control conditions. However, there is evidence that this student actually has multiple perceptual strengths which are unable to be detected using the LSI:P, due to its forced choice format.

The case study information also shows of the two students who expressed weak kinaesthetic preferences (excluding the native speaker)(**Case studies C and E**), one student actually performed very well during kinaesthetic lessons (**C**). One possible reason for this effect is that the student did not actually understand her perceptual

strengths. Another possible reason is the effect of other learning style elements, which were not deliberately manipulated but also were not controlled. The other student who expressed a low kinaesthetic preference (**E**) performed better during the control lessons than during the kinaesthetic lessons on two out of three occasions. The exception was a kinaesthetic lesson which had strong tactile and visual elements (the game lesson, K3B). The superior performance of this student during this lesson could be attributed to the fact that these elements effectively accommodated her tactile/visual first preference. This student was also the only one who failed to make any vocabulary gains during K7B, the kinaesthetic lesson which failed to provide the children with written representations of the target vocabulary.

No significant effects were found in favour of improved performance under matched preference and instructional method conditions. There are a number of possible reasons for this result. Firstly, the group was very small, and while it is possible to use the selected methods of analysis with very small samples, a small number of anomalies can also skew the results. The case study information suggests that at least two of the children (**Case studies C and F**) did not identify their perceptual strengths accurately. These two children made very large gains in "mismatched conditions". Another reason is that perceptual preference is only one of twenty-one learning style elements and it appears that other elements were equally or more important than perceptual preferences for individual children on a number of occasions. A further reason is a possible spread of effect from the experimental to the control conditions. As the children became more experienced and confident in using their preferred modalities during the experimental lessons, they became more active during the control lessons and actually changed the control conditions to suit their preferences. Furthermore, as the children's enjoyment of language learning increased they not only improved their language learning attitudes and beliefs, but also their behaviour during the control lessons.

The children's performance on the final examination showed that the class as a whole made substantial long term vocabulary gains. These gains were greater for some individuals than for others. The children with definite kinaesthetic preferences (**Case**

studies F and H) performed substantially worse than the other children on the written component of the final examination. In the case of one of these students (**F**), this may have been due to the fact her initial Bahasa Malaysia competence level was far below that of most of the other students at the beginning of the intervention. However, this explanation does not hold for the other student (**H**), who gained moderate scores in the pre-tests throughout the intervention. The case study information suggests that there may have been other elements of this student's learning style which caused her to be relatively disadvantaged by the intervention.

All the children obtained perfect scores on the oral component of the final test, including those children who did not perform so well on the written component. This suggests that young children are capable of acquiring oral vocabulary before they are necessarily capable of recognising the words in written form. This is an important finding, since written testing may indicate that young children are failing to learn a language, when in fact they have not reached the stage where they can recognise the words in visual form. At a later stage of second language learning development, words acquired in oral form may be recognised in written form as literacy skills are acquired in the second language or transferred from the first language (**Case study B**).

Chapter 7

Conclusion

Discussion

It was demonstrated that it was possible for this group of young Malaysian children to express their beliefs about their learning styles, including their perceptual preferences. The Learning Style Inventory (Perrin, 1991) proved to be a useful tool in assisting the children to think about and express their preferences. This finding is consistent with previous research involving the LSI:P, which has shown that young children do have individual learning style preferences and are capable of expressing them (Coleman, 1988; Crino, 1984; Moss, 1982).

A useful contribution of this study has been to demonstrate that, with minor adaptations, the LSI:P can be used with children from a different cultural background from that for which it was originally designed. It was also found that the use of large charts and moveable cutout illustrations helped the children to understand the items and express their preferences. The moveable figures allowed shyer children to express their preferences without speaking, and also enabled the children to use their preferred tactile preferences. The structured interview format gave direction and consistency to the interviews while providing the children with an opportunity to express their thoughts in their own words and encouraged them to feel that their opinions about their learning preferences were valued. It also allowed the children with strong kinaesthetic preferences to demonstrate their preferences by physically performing relevant actions (for example by showing how they prefer to stand rather than sit).

The results of the LSI:P interviews confirmed the hypothesis that the children would express preference for tactile or kinaesthetic learning activities over auditory or visual activities. This finding is consistent with those of a number of studies conducted within the United States (Fox, 1989; Damian, 1988; Miller, 1985, all cited in Perrin

1991, pp. 3-5; Perrin, 1984; Wheeler, 1983/19840. Whilst culture has been found to be a factor in influencing learning style, biological factors may be more important in determining the learning styles of young children across cultures. Biology influences individual learning styles throughout life but cultural and formal learning add substantial effects for older learners (Plowmin, 1989). Young children from different cultures may be more similar to each other than to older learners from their own cultures. The suitability of learning activities which are provided for young children cannot be determined solely on the basis of the learning styles of older learners from their own cultures. Whilst educational programmes designed for young children from diverse cultures should be culturally appropriate, they should also take account of young children's learning styles and the importance of developmentally appropriate learning activities.

Another important finding was that these children also had moderate auditory and/or visual preferences. This meant that they were not likely to be particularly disadvantaged by the auditory/visual control lessons. Therefore, any advantage attributable to the tactile and kinaesthetic experimental lessons is particularly meaningful. The existence of moderate auditory preferences in such young learners is a little surprising, and was not foreseen on the basis of existing research findings. However, it is possible that a variety of social and cultural factors have contributed to early development of auditory skills. Although it is not possible to use the results of the LSI:P to determine whether any of these students has multiple perceptual strengths, the performance of some of the students indicated that they were indeed capable of achieving good vocabulary gain using a variety of modalities.

The intervention as a whole had very positive effects on the children's language learning performance. Significant gains were made in all of the experimental lessons and just over half of the control lessons. Comparison of gains made between control and experimental lessons within each week showed that the children performed a little better overall in the experimental lessons than in the control lessons. Over the course of the intervention, the children's pre-test scores steadily increased and by the end of the intervention it was not possible for them to continue to demonstrate large gains in vocabulary recognition. Possible explanations could lie in the overall change in the

children's language learning attitudes and beliefs, and the increasingly active role they assumed during not only experimental but also (as the intervention progressed) during control lessons. The changes in behaviour which were observed during control lessons indicate that the effects of the new experiences which the children had during the experimental lessons may have been transferred to subsequent control lessons. The spread of effect made it difficult to demonstrate statistically any effect of the experimental lessons but was certainly educationally desirable. The overall improvement in both attitudes and performance demonstrated the value of taking learning styles into account when planning and conducting second language programmes for young children.

It was not proven that children with stronger tactile or kinaesthetic preferences were "more matched" or made greater gains in tactile or kinaesthetic lessons than those children who had expressed lower preferences for these modalities. This result is not at all surprising since all of the children expressed either tactile or kinaesthetic first preferences. Although the LSI:P ranks perceptual preferences in order of strength, it does not allow for the expression of multiple strong preferences. Therefore, it is possible that some of the children could have had multiple perceptual strengths and been able to learn equally well in a variety of conditions. More detailed examination of individual results and profiles (in the Case Studies) did, however, show that for some individuals strength of preference was important. Furthermore, although the tactile and kinaesthetic lessons were of benefit to the class as a whole, there were several children who did not perform as well in one or other of the experimental conditions as they did in the remainder of the lessons. A further possible explanation lies in the multi-dimensional nature of learning style preferences. Whilst it is unlikely that an individual will have preferences for all possible learning style elements, there is usually more than one element at a time which is important (Dunn, Dunn & Perrin, 1994). In a number of cases, there may have been other, uncontrolled learning style elements which were more important during particular lessons than perceptual preferences.

Little previous research has been conducted with young second language learners and so it is not possible to compare the findings of this study with other language learning studies which have used comparable methods and participants. The results were

consistent, however, with previous research with young children in other areas of the curriculum. This supports the view of second language learning as involving complex cognitive processes which are, on the whole, not dissimilar to the processes involved in other types of learning (O'Malley & Chamot, 1990). Whilst it is desirable that instruments designed to measure learning styles are linguistically and culturally appropriate for second languages learners, it is not necessary to regard language learning as a separate case from other types of learning. It does not seem necessary to develop learning styles model specifically for second language learning, since more general models (such as the Dunn & Dunn Learning Style Model) are capable of encompassing the styles and needs of a diverse range of learners, including second second language learners.

Limitations and strengths of the study

The most immediate limitation of this study is that the small size of the sample makes statistical analysis very difficult and also, when the nature of the sample is taken into account, severely limits generalisability of the findings. It was also not possible to fully “control” what occurred during control lessons. These limitations arose out of administrative and structural constraints within the kindergarten and other constraints which are integral to conducting educational research in natural settings. As Lightbown (1990) has pointed out, “doing research on how instructional variation affects learning in classroom settings is one of the most frustrating endeavours known” (p. 82). In addition to the difficulties associated with educational research in general, studies concerned with second language learning face the added complication that language learning frequently continues outside the classroom, completely outside the influence or observation of the researcher.

The small size of the sample did, however, give rise to a major strength. It allowed more detailed observation of the children than is usually found in learning styles research studies. The inclusion of the qualitative data facilitates the understanding of the quantitative analysis and also provides a reminder that preferences for single learning styles elements do not operate in isolation from other preferences (Dunn et al, 1994). Another strength of this study was that it was carried out over seven weeks and a total of fourteen lessons which enabled assessment of longer term effects of the changes in instructional methods. Finally, it was demonstrated that despite all the difficulties and constraints that are part and parcel of conducting research in an authentic setting, it was possible to provide evidence of the effects of instructional variation on second language learning.

Implications for teachers

Teachers have a choice of teaching methods which they can adopt in their classrooms. This choice may be based on a range of factors including; tradition, experience, personal beliefs about the nature of learning, availability of resources, time constraints, and expectations of parents, students and administrators. It cannot be assumed,

however, that the teaching methods that are adopted are the most appropriate for individual children, or even for the class as a whole without measuring and comparing the effects of alternative methods of instruction. If the aim of instruction is to maximise individual learning, then teachers need to be aware of the range of variables which are important for individual children. It is possible to use a valid and reliable tool, such as the LSI:P to provide both teachers and learners with information about the sorts of needs, preferences and differences which are important for individual learners.

Although many young children are aware of the ways in which they learn best, and are able to express these preferences, this is not true for all children. It may be necessary to engage some children in an ongoing process of experimentation and reflection, in order to assist them to choose activities which maximise their learning. Some children are able to learn effectively using any perceptual modality. Other children may have strong preferences for only one modality and yet other children may require a multisensory approach, in which information which is introduced in their preferred modality and reinforced in other ways

It must be recognised that learning style is not static, particularly among young children and perceptual preferences often change over time. Children need experience of a variety of activities, utilising the whole range of perceptual modalities, in order to explore and establish their preferences and to be able to recognise when these have changed and when it is time to try a different approach. It is also important to recognise that learning style is a multi-dimensional concept and elements other than perceptual preferences may be more important than perceptual preferences for some children, particularly in different types of lessons.

Although most young children have tactile and or kinaesthetic preferences, language teachers must remember to include auditory and visual stimuli when utilising tactile and kinaesthetic teaching methods. It may be particularly important to remember to include visual representations of words when using kinaesthetic methods, if the children are expected to be able to recognise the words in written form. Lessons which do not use tactile and kinaesthetic lessons may be effective some of the time, if the learners have a moderate level of preference for these modalities, but they may become less effective if

the other modalities are not used as well. Even very good auditory visual lessons may not be effective, as the learners become bored, not with the content, but with the teaching methods.

Natural language learning, inside or outside schooling, is multisensory, and intrinsically kinaesthetic as learners are immersed in the language learning environment and engage in authentic activities with speakers of the target language. Kinaesthetic language teaching activities may utilise the same processes as natural language learning, especially in young children. However, teachers should be aware that learners may not have existing literacy skills, or may not automatically transfer existing literacy skills to a new language. If the development of literacy in the new language is important, then this must be taken into consideration while planning and conducting kinaesthetic lessons. On the other hand it is important to recognise that oral language acquisition may precede the development of literacy in the second language. It is particularly important to be able to recognise and acknowledge the developing language competence of young children who may not be able to demonstrate this competency during formal, written testing.

Implications for research

This study encountered many of the difficulties of conducting educational research in a natural setting. Although more reliable results may be obtained in controlled settings, it was useful from an educational perspective to discover what it was possible to achieve in an authentic classroom setting. This study did confirm that it is possible for young children to identify and express learning style preferences although it provided only modest support for the idea that individual performance can be enhanced by suiting instructional methods to learning style preferences. It would be useful for teachers to assess the learning styles of their own students and monitor the effects of changes in teaching methods. Inclusion of qualitative information along with quantitative analysis can provide the richness of detail that is necessary in order to understand the effects of individual differences.

Since this is one of only a few studies which have been conducted with young second

language learners, it would be desirable to replicate it with a larger sample and with children of other cultural and linguistic backgrounds. It would also be desirable to look at how preferences for learning style elements operate in combination, rather than assuming that they can be isolated from each other (Braio, 1995/1996).

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Appendices

Appendix 1

Original items on the Perception subscale of the Learning Style Inventory: Primary (Perrin, 1982, 1991) and modified items used in this study.

QUESTIONS

When you have something important to learn, which is the better way for you to remember it:

Original item

1. 2 listen to a story about it on a tape recorder?
or
 3 see a filmstrip story about it?

Modified item

1. 2 listen to a story about it on a tape recorder?
or
 3 see a video about it?

Original item

2. 3 look at pictures?
or
 1 put a puzzle together about it?

No change was made to this item

Original item

3. 3 see a movie about it?
or
 4 play a game about it?

Modified item

3. 3 see a video about it?
or
 4 play a game about it?

Original item

4. 2 listen to someone tell you a story about it ?
or
 3 see a film about it?

Modified item

4. 2 listen to someone tell you a story about it ?
or
 3 see a video about it?

Original item

5. 2. listen to a record about it?
or
 1 build a model with clay about it?

Modified item

5. 2 listen to a tape about it ?
or
 1 make a collage about it?

Original item

6. 2 have a story read to you about it?
or
 4 act out a story about it?

No change was made to this item**Original item**

7. 1 draw a picture on paper about it?
or
 4 build a project with blocks about it?

Modified item

7. 1 draw a picture on paper about it?
or
 4 go on a field trip?

Original item

8. 1 paint a picture about it ?
or
 4 act in a play about it?

Modified item

8. 1 paint a picture about it ?
or
 4 do an action dance about it?

Original item

9. Let's look at the pictures again. (Repeat the introduction) Which picture shows the way you remember things best? Ask the child to point to one picture or verbally respond.

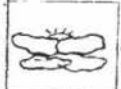









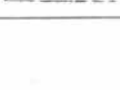





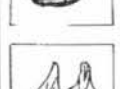
No change was made to this item

Appendix
Pre- post-tests

Control 1A

Nama
Tarikh












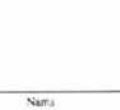
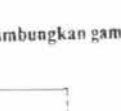
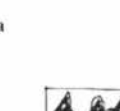







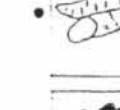
Sambungkan gambar dan perkataan bersama

	<u>Cuaca</u>	
	hujan	
	cerah	
	mendung	
	berangin	
	salji	
	payung	
	banjir	
	kilat	
	baju hujan	
	baju renang	

Control 1B

Nama
Tarikh

Sambungkan gambar dan perkataan bersama

	<u>Pekerjaan</u>	
	peguam	
	guru	
	posman	
	anggota polis	
	ahli bomba	
	tukang jahit	
	askar	
	juruterbang	
	angkasawan	
	kelasi	

Tactile 2A

Nama
Tarikh

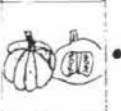















Sambungkan gambar dan perkataan bersama

	<u>Sayur-sayuran</u>	
	bawang	
	halia	
	bawang putih	
	ubi kentang	
	tomato	
	terung	
	kangkung	
	timun	
	bendi	
	cili	

Control 2B

Nama
Tarikh











Sambungkan gambar dan perkataan bersama

	<u>Sayur-sayuran</u>	
	cendawan	
	lobak putih	
	bayam	
	jagung	
	labu	
	kubis	
	keladi	
	tauge	
	lobak merah	
	kacang panjang	

Control 3A

Nama
Tarikh

Sambungkan gambar dan perkataan bersama

	<i>Pergerakan</i>	
		
		
		
		

berdiri

senyum

menulis

tikam

duduk

berjalan

melompat

membaca











menghidu

sentuh

Kinaesthetic 3B

Nama
Tarikh

Sambungkan gambar dan perkataan bersama

	<i>Pergerakan</i>	
		
		
		
		

menangis

tunjuk

mendengar

menari

melihat

melukis

ketawa

memegang


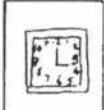







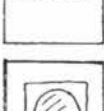
tepuk tangan

berlari

Control 5A

Nama
Tarikh

Sambungkan gambar dan perkataan bersama

	<i>Di Rumah</i>	
		
		
		
		

akuarium

jam

kerusi

kipas

lampu

almari

bantal

cermin





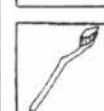



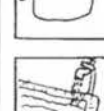

katil

sikat

Tactile 4B

Nama
Tarikh

Sambungkan gambar dan perkataan bersama

	<i>Di Rumah</i>	
		
		
		
		

apron

cawan

cerek

kuali

periuk

air

baldi

berus gigi

besen

tuala

Control 7A

Nama
Tarikh:











Sambungkan gambar dan perkataan bersama

	•	<i>Kesihatan</i>	•	
	•	beg	•	
	•	stetoskop	•	
	•	picagari	•	
	•	termometer	•	
		topang		
		carta pemeriksaan mata		
		topi		
		kain pembalot		
		tukul		
		kapas		

Kinaesthetic 7B

Nama
Tarikh:

Sambungkan gambar dan perkataan bersama

	•	<i>Kesihatan</i>	•	
	•	anduh	•	
	•	ubat	•	
	•	doktor	•	
	•	juruwat	•	
		pesakit		
		kerusi roda		
		gambar X-ray		
		katil		
		ambulans		
		kaki patah		

Appendix 2b

Word lists for lessons with oral tests

1. Tactile lesson, T4A,
Di Bandar

lintasan belang
tudung longkang
jejentas
tong sampah
papan tanda isyarat
motosikal
pondok telefon
bas
peti surat

2. Control lesson C4B,
Di Bandar

perhentian bas
lori
tiang lampu
bangunan isyarat
kaki lima
kereta
jalan raya
kereta polis
kapal terbang

3. Kinaesthetic lesson 6A,
Memasakkan

mangkuk
papan potong
sudu besar
garam
tuala kertas
pisau
sudip
tepung pisang goreng
pinggan
pisang

4. Control lesson 6B,
Memasakkan

limau
penyapis
garpu
jag
gula
lada
kicap
telur
senduk
mi

Appendix 3

Language learning attitudes and beliefs questionnaire

Name:

Class:

Date:

Directions: This questionnaire has been designed to assess the beliefs of students about Bahasa Malaysia and their feelings about themselves as learners. Please ask these questions to the students individually and record their individual responses on copies of this sheet. To get an estimate of the strength of the students' feelings, I would like you to ask them how strongly they agree or disagree with the statements below.

- Please circle
- 1 if the student strongly disagrees
 - 2 if the student disagrees
 - 3 if the student doesn't know
 - 4 if the student agrees
 - 5 if the student strongly agrees

It may be difficult to get the students to estimate the strength of their beliefs, but please try.

Attitudes and Beliefs

	S D D U A S
Bahasa Malaysia is easy to learn	1 2 3 4 5
I am good at Bahasa Malaysia	1 2 3 4 5
Bahasa Malaysia is interesting	1 2 3 4 5
Bahasa Malaysia is a good language	1 2 3 4 5
I like Bahasa Malaysia	1 2 3 4 5
I enjoy learning Bahasa Malaysia	1 2 3 4 5
I think I am going to do well in Bahasa Malaysia	1 2 3 4 5
I feel happy during Bahasa Malaysia lessons	1 2 3 4 5
I can learn Bahasa Malaysia	1 2 3 4 5
My Bahasa Malaysia teacher thinks I am a good student	1 2 3 4 5

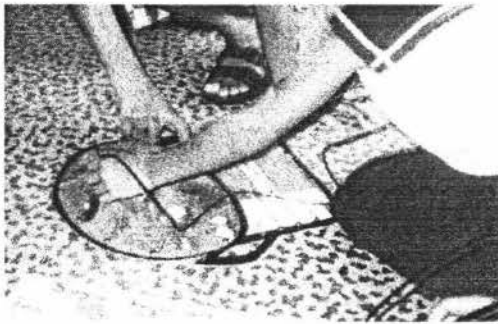
Appendix 4
Examples of tactile learning activities



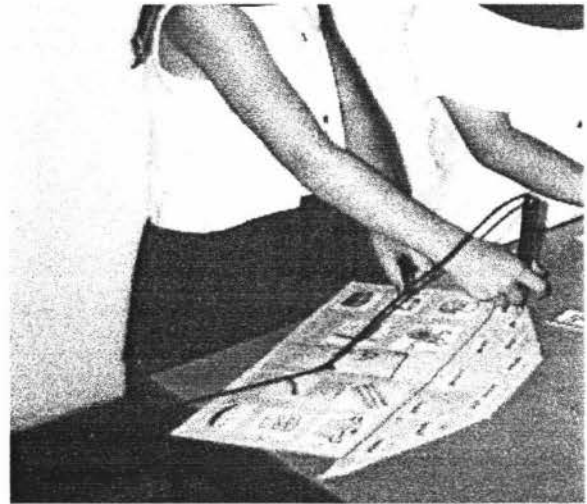
Advanced task cards



Simple task cards



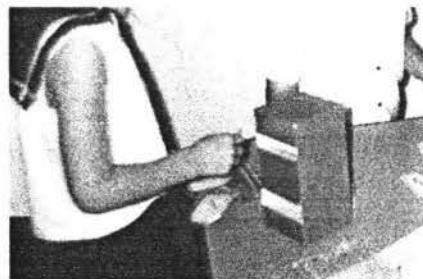
Electroboard



Electroboard



Cut and paste worksheet



Flipchute



Vocabulary wheel



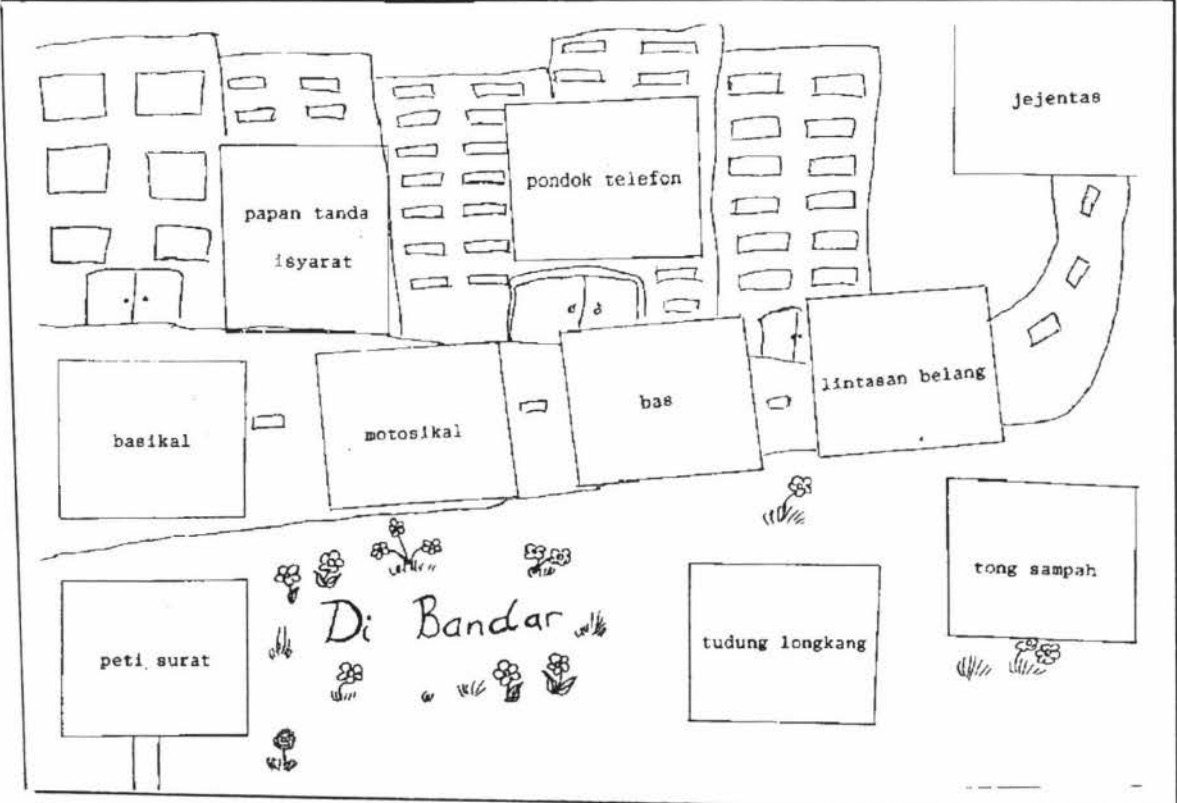
Picture/word windows



Pic-a-hole

Appendix 5 Tactile Worksheet : Lesson T4A

Arahan
Guntingkan gambar-gambar kecil dan tampalkan ditempat yang sesuai pada gambar besar mengikut senral. Warnakan gambarajah.

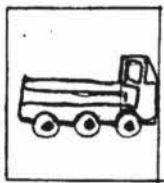
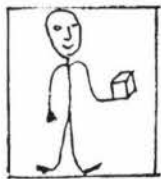
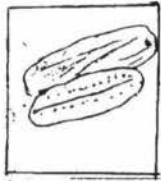
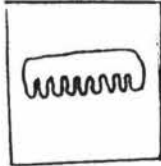


(Reduced size)

Appendix 6
Final examination
(reduced size)

Nama:
Tarikh:

Sambungkan gambar dan perkataan bersama



garam

jag

baldi

sikat

lori

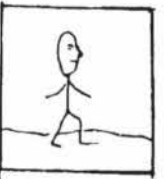
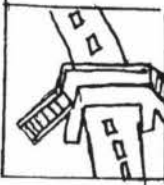
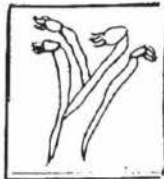
jejantas

memegang

berjalan

timun

tauge



Tandakan (✓) pada jawapan yang betul

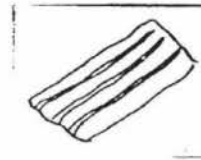
1. sudu besar ()
pinggan ()



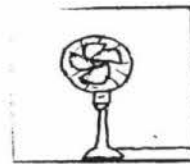
2. telur ()
gula ()



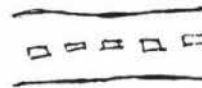
3. tuala ()
besen ()



4. kipas ()
almari ()



5. jalan raya ()
lampu isyarat ()



6. tong sampah ()
 lintasan belang ()



7. melihat ()
 berlari ()



8. melompat ()
 sentuh ()



9. halia ()
 cili ()



10. lobak putih ()
 kacang panjang ()



Bulatkan perkataan yang betul.



1. papan potong sudu besar tuala kertas



2. telur penyapis lada



3. apron kualiti air



4. kipas jam lampu



5. kereta jalan raya kapal terbang



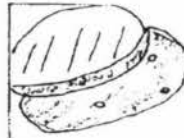
6. papan tanda isyarat basikal tong sampah



7. melihat tunjuk ketawa



8. menghidu berjalan senyum

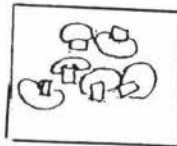
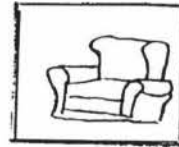
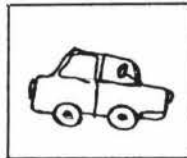
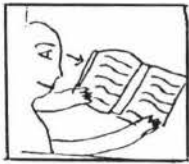
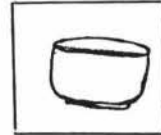
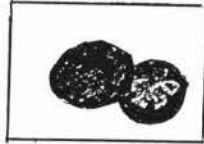
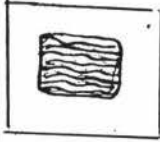


9. bawang kangkung ubi kentang



10. lobak putih kacang panjang kubis

Pilih perkataan yang betul dari kotak dibawah dan tuliskan jawapan dibawah gambar berikut.



<i>mangkuk</i>	<i>mi</i>	<i>besen</i>	<i>kerusi</i>
<i>kereta</i>		<i>peti surat</i>	<i>ketawa</i>
<i>membaca</i>		<i>tomato</i>	<i>cendawan</i>

Vocabulary for oral test

tuala kertas

senduk

berus gigi

bantal

perhentian bas

basikal

tepuik tangan

senyum

kangkung

kubis