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Implementation as a Function of the Relationship  
Between Personality Style and Program Design

by .

Floriana L. Albi

Thesis submitted to the School of Graduate Studies  
of the University of Ottawa  
in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy in Education

Ottawa, Canada, 1988

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Dedicated  
to my husband, Elmiro,  
for his role  
in inspiring me  
to pursue my studies.

And to our  
four children:  
Andrew, Elena, Gianna, and baby-to-be,  
looking forward to the future  
and reminding us of  
the importance of quality education.

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The teacher, like the artist, the philosopher, and the man of letters can only perform adequately if he (she) feels himself (herself) an individual directed by an inner creative impulse, not dominated and festered by authority.

Bertrand Russell

## Abstract

### Implementation as a Function of the Relationship Between Personality Style and Program Design

Implementation is the use of a program in a classroom with an emphasis on what changes in practice. The present study ( $N = 60$ ) is an investigation of the relationship between personality style (integrative cognitive/affective systems of perceiving and judging) and three aspects of the implementation process of a Primary Environmental Studies Program (a) degree of program implementation, (b) type of program delivery, and (c) preference for teaching activity types (grades 1 to 3).

A basic problem in effecting change is the compatibility between the program as intended and the program as perceived by the teachers. If people perceive and judge the same situation in different ways resulting in different behavior and needs, then it seems likely that these basic differences could also influence more specific behavior such as program implementation. It is hypothesized that when there is a match between the type of person and the type of program, there is a higher degree of implementation because people act in a manner consistent with their beliefs.

A Jungian framework (sensing/intuiting, thinking/feeling functions) was used to produce compatible schemes of classification for both programs and people so that each of the three research questions could be operationalized. Using

a chi-square statistic to investigate the relationship between the levels of use focused interview (Loucks et al., 1975) and the Myers-Briggs Type Indicator (MBTI) (Myers & McCaulley, 1985), intuitive teachers were found to be significantly associated with higher degrees of program implementation ( $p < .01$ ). A chi-square statistic was also used to examine the relationship between type of program delivery, as measured by the innovation configurations profile (Heck et al., 1981), and personality style. Three main program components were subdivided into dimensions: (a) hands-on activity (kinds of materials, student/teacher handling of materials); (b) child-centred approach (kinds of student choice, type of planning, classroom setup); and (c) integration (kinds of integration, kinds of scheduling, use of activity centres). Significant associations were found between intuitive teachers and four dimensions (a) more integration ( $p < .01$ ), (b) more flexible scheduling ( $p < .01$ ), (c) more use of activity centres ( $p < .001$ ), and (d) a greater focus on individual student planning when this dimension was reclassified as part of the integration component ( $p < .05$ ).

Using a Tukey Multiple Pairwise Comparison it was found that sensing/thinking and sensing/feeling teachers prefer sensing/thinking activities; and intuitive feeling/thinking teachers prefer intuitive/feeling activities ( $p < .05$ ). Other patterns extracted from the data by descriptive

analysis indicate that there is an association between a preference for teaching activity types and personality style. For example, sensing/thinking teachers preferred sensing activities over intuitive activities, and thinking activities over feeling activities. The other subjects also displayed a preference pattern matched to their own type. Similarly, activity type choice is also related to dominant or governing personality style functions because sensing, intuiting, thinking, and feeling teachers preferred activities suited to their type.

The present study is a contribution to the literature by (a) demonstrating that personality style is a factor in the implementation process, (b) developing a methodology so that research intended to investigate the relationship between program components and personality style may be facilitated, (c) giving empirical support for the classification of program components using a Jungian framework, and (d) extending the application of the MBTI to curriculum implementation. On the other hand, the results are limited in that intuitive/thinking subjects are underrepresented in the sample because this type of individual is rare at the primary teaching level. Furthermore, the generalizability of the results are limited to one program. Yet, the main program components are not program specific thereby increasing the potential generalizability of the results to other types of programs by inference.

The findings of the present study indicate that implementation concerns may be addressed not only by a system perspective but also by a teacher perspective. More specifically, teachers as professionals, may be invited to engage in an analysis of (a) their own personalities, (b) curriculum documents, (c) their own teaching preferences, and (d) the individual needs of their students to make defensible curriculum choices. Programs could be written including a balance of different types of activities thereby increasing their appeal to a wider cross-section of teachers. There is a need to become more sensitive to the underlying assumptions of implementation strategies and planned professional development opportunities so that teachers are viewed as a positive implementation force.

## Chapter. 1

### Introduction

During the past ten years, the trend has been to solve the problem of effecting change by seeking correct implementation steps from the administrators' point of view. Teachers are often perceived as obstacles to program implementation because of their lack of interest, initiative, or knowledge. This perception tends to support theories which attribute the lack of program implementation success to teacher incompetence. Energy may thus be directed towards promoting change by adopting strategies without considering the social, psychological, or philosophical reasons for teacher actions. In other words, attention may be paid to the "what" and the "how" of implementation but not to the "why."

The purpose of the present study is to contribute to an understanding of implementation issues by investigating why some teachers implement particular kinds of programs to a higher degree than other teachers. Fullan (1982) suggests that what is needed is an integration of the general knowledge of change theory with the detailed knowledge of teacher personalities because subjective perceptions may function as powerful constraints to change. The compatibility between the program as intended and the program as perceived by specific teachers, influences the degree and type of implementation. Herein lies a basic problem in

effecting change.

There has been a shift in research interests from how teachers behave to how teachers think heralding a cognitive science perspective as a new development in curriculum research. Clark and Yinger (1977, p. 301) maintain that researchers on teacher thinking have made a promising start towards understanding teacher behaviors and that "the most exciting possibility is that research on teacher thinking may unite the concerns of researchers on instruction and teacher behavior with those of researchers on curriculum and materials." They further conclude that the "thinking of teachers may be the strategic research site that yields the first practical theory of instruction." An underlying assumption of the present study is that what teachers do is affected by what they think, and that if we are to understand how research is put into practice or how programs are implemented, then we must know how teachers exercise judgment and make decisions. It is essential to understand how teachers view the curriculum and how their perceptions influence the specific ways in which the program is delivered to the students. Thus, one high priority research area is the examination of the complex and subtle relationships between implementation, teacher personality style, and program design.

The present study addresses some current and practical educational needs which are ultimately aimed at the

improvement of student learning. While a great deal of energy, time, and money has gone into program improvement, the results in terms of implementation are somewhat disappointing. There is a need to help change agents at the school or system level to better understand the dynamics of implementation so that the levels of program implementation may be increased. Another need which is addressed is the need to consider the teacher as a professional. The premise of the present research is that perhaps more effective implementation may take place through teacher awareness rather than through teacher management. The approaches being explored in the present study may allow teachers to become more critically aware of their own teaching preferences. This may in turn lead to the acknowledgement of individual teacher differences as a positive force in implementation.

Very few studies focus on the person factor in implementation. Fullan and Park (1981) state that the behaviors, skills, and beliefs of people have been frequently overlooked in favour of consideration for materials and regulations. The present study focusing on an understanding of implementation issues, addresses this concern by exploring the influence of personality style on one program. It is hypothesized that when there is a match between the type of person and the type of program, there is a higher degree of program implementation. More specifically, the three research questions are:

Is the degree of program implementation a function of personality style?

In what way does personality style influence the way a program is taught?

In what way is the preference for particular kinds of teaching activities a function of personality style?

One of the challenges in the present study to answer the above questions is the design of an appropriate methodology. Both an understanding of implementation theory and practice, and teacher personality is needed in order to be able to define and describe a program, and to choose the level of the investigation in terms of "personality" which is in itself a very complex topic. It is also necessary to find a unifying theory to produce compatible schemes of classification for both programs and people. The curriculum chosen for this research is a relatively new Primary Environmental Studies Program which has been in use for approximately two years. The data analysis plan ( $N = 60$ ) includes both confirmatory and exploratory procedures to gather the maximum amount of information. Descriptive statistics are also utilized to identify other patterns which can be extracted from the data.

The reader is introduced in chapter 2 to a focused

literature review encompassing factors related to implementation, the role of the teacher in implementation, research findings on the person factor, and personality dimensions. Chapter 3 consists of the presentation of the research problem which includes a description of the variables, the theoretical framework, and a statement of the research problem and hypotheses. Chapter 4 contains specific information on methodology (a) the choice of instruments and sample, (b) the rationale for program choice and methodology used, (c) the preparation for data collection, (d) the procedures for collecting data by questionnaires and interviews, (e) assumptions, (f) limitations, and (g) an overview of the data analysis plan. The findings are presented and discussed in chapter 5, research question by research question, so that the results proceed from the general to the specific. Chapter 6 concludes with an overview of the study, contributions and limitations, implications for practice, and suggestions for further research.

## Chapter 2

### Review of the Literature

The aim in chapter 2 is to define implementation and describe its purpose, occurrence, and the factors which facilitate or hinder it. Also discussed are the role of the teacher, the nature of the teacher's practical thinking, and the importance of person factors in implementation. The chapter concludes with research on person factors in implementation and a description of personality dimensions as expressed in the literature.

### Implementation As a Process

Implementation is the actual use of a program as opposed to the intended or planned use of a program. Therefore, in the present study, implementation is defined as the operationalization of a program in a classroom. Wright (1982, p. 190) states that this operationalization is comprised of three sequential stages (a) adoption, (b) early use, and (c) full use/renewal. This does not mean that all teachers or all implementation attempts progress through all three stages. Efforts which terminate during or immediately after adoption result in non-implementation. If the teacher reverts to previous practices then this is called cooptation. In other words, the features of the program consistent with

conventional practice become the focus of attention, and important new features are ignored (Berman & McLaughlin, 1976, p. 352). The full use/renewal stage of the implementation process may be achieved by what Fullan and Pomfret (1977) call a fidelity perspective. In this case the intentions of the developers are adhered to very closely. It may also be achieved by a mutual adaptation perspective in which the program becomes changed or developed during the process or through a combination of both (p. 340).

Implementation takes place when the curriculum system merges with the instructional system, a point at which the program becomes a working tool for the teachers to instruct their students (Beauchamp, 1975, p. 164). More specifically, it is the process of changing existing practice to some new or revised practice by means of altering the materials, beliefs, or teaching approaches in order to improve student learning outcomes (Fullan & Park, 1981, p. 6). Wright (1982) maintains that this change is the result of the interaction of six implementation elements (a) the curriculum, (b) the people, (c) the organization, (d) exogenous (external) intervening variables, (e) endogenous (internal) intervening variables, and (f) implementation strategies (p. 190-1).

Some writers claim that "implementation" is too harsh a term and that it presupposes that one can install changes by using particular strategies. Connelly (1982), for example, suggests that it be abandoned in favour of "curriculum

inquiry" which is "softer, more human, and developmental" (p. 22). Roberts (1980, p. 75) proposes a "developer-teacher interface" because in his opinion, the program writer has a predetermined idea of hypothetical pupils and classrooms. He further suggests that there is no one best theory or correct approach because any single theory or approach is incomplete and because teachers rely on a variety of theories. A partnership between teachers, curriculum developers, and researchers is one way to address the gap between theory and practice. Research cannot be applied directly to the classroom because the focus of research is generalization, while teachers tend to concentrate on the specifics of their own teaching environment. More specifically, programs are developed on the basis of particular approaches which reflect the current thinking in particular subject areas. Teachers, on the other hand, are required to implement these programs within the context of their own teaching preferences, the type of students in their classes, and the physical environment of the classroom itself. Herein lies a basic problem in effecting change because implementation plans often do not take into consideration specific teacher needs.

Another aspect of the gap between theory and practice is the difference between intentions underlying curriculum research and perceptions by curriculum workers such as support staff and administrators. Werner (1980b) states that research findings are not applied directly but are first

interpreted by curriculum workers on the basis of their own knowledge and experience (p. 147). The term he uses to designate the impact of curriculum research upon the thinking of curriculum workers is "reciprocity" (p. 145). He also maintains that researchers and change agents at the system or school level have a responsibility to take into account the impact of their activities, so that data may be generated from the teachers' perspective in order "to build understandings of implementation that remain faithful to the experiences of those people who live that reality" (p. 151). In other words, as curriculum workers translate research findings into concrete strategies for implementation, they should take into account the practical realities within which teachers function.

#### Approaches to Implementation

There have been numerous attempts to increase program implementation. Doyle and Ponder (1977-78) demonstrate that there is a dichotomy consisting of prescriptive literature offering strategies for accomplishing change and descriptive literature documenting unsuccessful implementation attempts. This relative lack of success further encourages a search for more comprehensive implementation strategies (see Common, 1981; Dow & Whitehead, 1981; Dow, Whitehead, & Wright, 1984;

Fullan, 1972, 1982, 1983, 1985; Fullan & Pomfret, 1977; Fullan & Park, 1981).

In practice, the way teachers are viewed has a bearing on the alleged reasons for the lack of implementation. If teachers are perceived as obstacles to change because of their lack of interest, initiative, or knowledge, then this perception could support theories attributing the lack of success to teacher incompetence. In this case, the change tactics could gravitate towards remedying the shortcomings of teachers. The danger is that energy may be directed towards administering change by adopting specific strategies without considering the social, psychological, or philosophical reasons for teacher actions. In other words, attention may be paid to the "what" and the "how" of implementation but not to the "why."

Implementation plans usually do not reflect the teachers' point of view. The trend among theorists and practitioners has been to solve the problem of effecting change by seeking correct implementation steps or recipes from the administrators' point of view. Werner (1980b) criticizes this approach and affirms its popularity because it is a "clean-cut" process which leaves out "the contextual (and messy) things that are a part of any implementation process" (p. 147). This may then lead to "a search for change tactics rather than for ways to enhance professional learning among adults who are competent and concerned within

their realm of expertise" (p. 148).

Olson (1985, pp. 295-299) is another writer who supports the view that the teachers' perspective must be taken seriously. He begins by describing two approaches to change which dominate implementation theory and practice. The bureaucratic or systems approach is based on the premise that inputs (decisions) and outputs (what happens in classrooms) can be tightly coupled. An underlying assumption is that those within the system understand the goals and have the technical capacity to implement them. The ecological approach is based on the premise that environmental factors which constrain teachers should be altered so that teachers can achieve their own potential. In contrast to these two, he further proposes the reflexive approach whereby it is assumed that teachers act rationally, tend to solve their problems effectively, but are not always conscious of how and why they do what they do. The basic difference between the first two approaches and the third is that the former stress implementation through teacher management, while the latter stresses implementation through teacher awareness. The choice is between "engaging teachers in activities designed to overcome their resistance to new ideas versus engaging teachers in an analysis of those ideas and of their potential uses for the teacher's situation" (Connelly & Ben-Peretz, 1980, pp. 101-102).

Writing from the point of view of management theory,

Nutt (1986) documents three other implementation approaches (a) a prescriptive approach involving the use of particular mechanisms to achieve change, (b) a tool approach using techniques such as brainwashing and reward systems to wear down resistance, and (c) a factor identification approach attempting to determine the essential steps in the change process (p. 231). These three approaches are somewhat similar to Olson's (1985) systems and ecological approaches mentioned above in that they advocate implementation by teacher management rather than by teacher awareness.

Whether one chooses implementation strategies focusing on teacher management or teacher awareness, there is a need for further research on the reasons for teacher actions vis-a-vis curriculum implementation. It is proposed that the present study could contribute to the literature advocating the professionalism of teachers, specifically with reference to viewing the teacher as a partner in the implementation process.

#### A Rationale for Considering the Role of the Teacher

In describing implementation, Fullan (1982, p. 295) states that every change is based on an explicit or implicit theory of education (which depicts what the change is), and a theory of change (which refers to the process that must be

followed to achieve implementation). Within this process, individuals must find meaning to answer two fundamental questions: "What does the change mean for what I do? What does the process of introduction and follow-through look like from my perspective?" These statements highlight individual meaning as being a central issue in curriculum implementation. One could argue that this applies to each stakeholder in the implementation process whether this person is a government official, supervisor, principal, consultant, or teacher. Fullan (1982) further declares that if these individuals who are responsible for implementation do not experience a sense of excitement, the mastery of new skills, and a clear understanding of the fundamental components of the change, then successful change is indeed elusive (p. 295).

The role of each stakeholder is important but what makes the role of the teacher particularly important is that teachers are the final implementers of any program and have both autonomy and vast opportunities to express their individualities with their students. Common (Note 1) attributes implementation failure to discrepancies between what administrators think teachers do and should be doing and what the teachers believe about themselves (p. 5). Herron (1971) states that teacher commitment and understanding are often assumed. He also maintains that teacher perceptions of the structure, goals, and basic philosophy of new course

materials constitute the roots of resistance to curriculum change (p. 48). Given this, it is important to understand how teachers view their role in curriculum decision making and how this view may influence both the degree of implementation and the the type of program delivery.

Connelly and Elbaz (1980) focus on the teacher by making a distinction between theoretical and practical interests. An emphasis on the theoretical may lead one to pursue the knowing and understanding of things while an emphasis on the practical may lead one to the doing and making of things. Using this dichotomy, they state that "science, psychology, and curriculum theory are theoretical pursuits; painting, acting morally, teaching, and doing curriculum are practical pursuits" (pp. 98-99). They further maintain that the proper study and thought about theoretical or practical topics should reflect the nature of the subject matter and that "to apply a theoretical stance to a practical field is to commit a conceptual fallacy." Following this line of thinking, they propose that the proper purpose of curriculum thought is not understanding, although this may play a role, but the improvement of practice of curriculum (p. 99). They conclude that methodologies localized in the nature of practice are required (p. 106) and that "there is little doubt that the application methodology is inadequate because teachers are autonomous curriculum agents" (p. 109) and "knowers of the practical" (p. 110).

Ben-Peretz and Tamir (1981) concur with the view that the role of the teacher should be a focus of inquiry in curriculum implementation. More specifically, they emphasize the idea that the role of the teacher is central and that it is necessary to find out more about how teachers construe their role in the implementation process. Considering that teachers are responsible for the degree of change which occurs in the classrooms, it may be worthwhile to consider the role of the teacher as being as important as the innovation in the process of change. Connelly and Ben-Peretz (1980) state this more forcefully in advocating that "concepts, ideas, and training programs need to be developed which stress the place of the teacher in school reform" (p. 100).

#### The Role of the Teacher in Implementation

Questions concerning the role of the teacher may be examined from two perspectives which are closely related. One deals with the role of the teacher in the implementation process and the other is concerned with the role of the teacher as implied in the program itself. Since each program consists of a set of implicit assumptions concerning role relationships in teaching and learning, the definition of role undoubtedly influences both implementation plans and

strategies as well as the perceived degree of implementation success.

Connelly and Ben-Peretz (1980) document the changing view of the teacher in implementation within approximately the last 25 years. The teacher was first considered to be a transmitter as attempted in the "teacher-proof" science curriculum materials, then an implementer, and finally an adapter of curriculum (p. 106). As an adapter, they describe the teacher as a partner in research and development and state that researchers and developers are "stepping beyond their proper function" by "attempting to shape the teachers' functions to their perceptions of what the teacher ought to be doing" (p. 98). In accordance with this philosophy, Ben-Peretz (1980) proposes that teachers should be released from a dependence on the developers' intentions and should be allowed to construct their own alternative versions of the curriculum (p. 61).

One may ask who is in the best position, and who has the responsibility to decide and choose what should be taking place in the classrooms. Roberts (1980) proposes that it is quite possible that upon a more careful examination of the practical character of the teacher's role, that one could derive theories of curriculum implementation which may be very different from those imposed by a top-down strategy (p. 78). Yet, there is one form of curriculum development, curriculum policy, where it is appropriate to expect teachers

to do as they are instructed (Connelly & Ben-Peretz, 1980, p. 98).

In commenting on the general tone of the character of the teacher presence in the implementation process, Fritz (1981) maintains that current thought and research often implies a somewhat negative view of teacher participation which focuses on deficits, shortcomings, and inadequate knowledge, skills, and motivation (p. 113). Olson (1985) expresses his concern with this view by stating that "the matter cannot be settled by simply assuming that the system's plans make more sense than those of the teachers" and that "to assume as well that an innovative plan is a fait accompli is to fail to appreciate the slow process of practically working out the implications of new visions of schooling" (p. 297). Roberts (1980) concludes that "so long as all parties see the theory and curriculum materials as directly telling teachers what to do, it is doubtful that the impasse will be broken" (p. 86).

The practical nature of the teacher's craft includes making a number of decisions within the context of a particular classroom which is place-specific and time-specific. Silver and Hanson (1982) classify these decisions into three types. The first type concerns the teaching act itself (e.g. teaching style, instructional strategies, class climate, physical setting, evaluation procedures). The second type of decision revolves around the

learner (e.g. learning styles; physical, emotional, social, and intellectual needs), while the third is concerned with the curriculum (e.g. content, quality, performance level, order and sequence, materials, mode and media) (p. 12). In addition, the teaching/learning process is characterized by an interaction between the teacher, the student, and the content to be learned. Thus, the role of the teacher is that of decision-maker in order to read the students' messages to resolve the duality of content versus process (p. 11). These decisions have a marked bearing on the position, role, and behavior of the teacher, and ultimately on the nature of the program implementation itself.

It is when a teacher carries out a personal interpretation of the curriculum that he or she is acting simultaneously as a developer and implementer. It is also here that the teachers' understanding of the intent of the curriculum becomes crucial. One may ask to what extent teachers are conscious of this process. The more conscious the role, the more potential there is for a teacher to work as a curriculum adapter, an ideal view demanding a very high level of commitment and professional expertise.

#### The Nature of the Teacher's Practical Thinking

The degree to which a teacher may be an adapter of

curriculum depends on personal knowledge and expertise. In terms of implementation stages, the teacher would be operating at the full-use/renewal stage. This may occur after much experience with a new program. Many teachers do not reach this level. House (1974) states that the professional information field of teachers is fairly restricted and that heavy teaching loads confine teachers to the classroom which further reduces access to new ideas and innovations (p. 69). He further describes the communication between teachers as being close but one which is dominated by personal rather than professional concerns (p. 75). Marsh, Willis, Newby, Deschamp, and Davis (1985) conclude that classroom teachers have difficulty finding time to select and analyse appropriate curriculum materials (p. 60).

In a comprehensive sociological study, Lortie (1975) declares that teachers do not tend to engage in "pedagogical inquiry," do not tend to share their knowledge, and view teaching as an expression of individual personalities. In commenting about the preparation of teachers, he also states that the training does not seem to result in the analytic turn of mind one finds in other occupations whose members are educated in colleges and universities. There is little discussion about the disciplines of observation, comparison, rules of inference, sampling, testing hypotheses through treatment, and so forth (p. 231). In other words, clinical issues are not connected with scientific modes of thought.

Silver and Hanson (1980) support this statement by asserting that "the traditional approach to understanding or describing a student's performance has been to list what he has learned (as measured by test scores, final grades, et cetera) rather than how he learned" (p. 1).

Lortie (1975) further maintains that the consequence of such an attitude is that the development of an effective technical culture is delayed and conservative doctrines receive less factual challenge. In addition, each teacher is encouraged to have a "personal version of teaching truth" (p. 231). These "personal truths" may contribute to a resistance to change. Plans for change may strike teachers as frivolous because "they do not address issues of boundedness, psychic rewards, time scheduling, student disruption, interpersonal support, and so forth. People interested in change should take such beliefs and preferences very seriously, for they reflect first-hand experience" (p. 235).

Oberg (1980) claims that both the "mental" nature of planning and the teachers' /lack of a critical or reflective attitude towards their own teaching have important implications for curriculum developers and change agents. In her review of the literature, she found that the most frequent decisions made by teachers are about activities and content. Decisions involving objectives and evaluation are infrequent and references to philosophical concerns or

theoretical issues are extremely rare. It appears that teachers focus either on the learner or on the subject matter rather than examining the possible interactions between students and programs (pp. 56-57). These characteristics of teacher thinking may account for the relative lack of implementation success. Stated succinctly "if the teacher is unable to monitor critically his/her teaching behavior in order to detect discrepancies between intentions and actual practice, then it is not surprising that innovations do not always result in the intended level of use, let alone yield the expected results" (p. 58).

For these reasons some curriculum specialists are advocating that successful change can only occur if teachers are given the opportunity to examine their own craft. There is a choice which involves either engaging teachers in activities designed to implement new programs or engaging them in critically analyzing the potential of these ideas for their own classrooms. This is not to imply that one can or should abandon systems perspectives or that one should replace teacher management with teacher awareness, but rather to focus on teacher awareness. Specifically, there is a need to focus on enhancing the effectiveness of the teacher, the final implementer of any program, in addition to planning collective efforts to achieve change. Fullan (1982) suggests that planning principles for implementation reflect "organized common sense" and that success will depend on

understanding the orientations and working conditions of the people in the school system (p. 104). One way of gaining further knowledge is to explore the influence of teacher personality style on implementation with the underlying assumption that teacher self-understanding is a very important part of the process.

#### The Importance of Person Factors in Implementation

Implementation research is yielding more and more specific information on the interrelationships between the elements of the implementation process. One of the questions arising out of Wright's (1982) study concerns intervening variables: "What are the characteristics of exogenous and/or endogenous intervening variables which make them facilitators and/or hinderers of curriculum implementation?" (p. 194). One of the endogenous factors identified in the study is the teacher's predisposition to change. Understanding teacher personality and promoting teacher self-understanding could be a powerful and positive implementation force especially considering that the majority of the implementation strategies have been planned from a negative point of view. Implementation goals are often focused on overcoming obstacles to change. An alternative viewpoint could be identifying and enhancing facilitating factors such as the

teacher's predisposition to the program change. Olson (1985) maintains that teacher reflection on practice should be encouraged because "the potential for productive change comes from an increased awareness of the practitioner's own practice" (p. 300).

Fullan and Park (1981) state that "the implementation process has frequently overlooked people (behaviors, beliefs, skills) in favour of things (e.g. regulations, materials) and this is essentially why it fails more times than not" (p. 13). They further suggest that personality itself may have an impact but they doubt the fruitfulness of examining personality factors because these factors are not easily altered (p. 13). On the other hand, indicating more of an interest in examining personality style, Fullan (1982) suggests that what is needed is an integration of the general knowledge of change with the detailed knowledge of personalities (p. ix) and that we need to "come to understand both the small and the big pictures," the small pictures referring to "the subjective meaning or lack of meaning for individuals" (p. 4).

Werner (1980a) is one of the writers who has researched the people aspect of the implementation process. He states that ideally implementation as a minimum requires a shared understanding among the participants concerning the implied presuppositions, values, and assumptions which underlie a program. Therefore, an initial task for the teachers would

be to understand the implicit beliefs of the program and their own beliefs about teaching and learning (p. 63). These beliefs influence program implementation because programs operate in accordance with the interpretations which people give to them. In another article, Werner (1981) states that the issue of enhancing shared understanding is a critical and complex one because individuals act on the basis of their own common-sense beliefs and perspectives. Thus, the same program may not be interpreted in the same way by all. "Beliefs" refer to the taken-for-granted assumptions, values, and expectations which formulate a teacher's orientation to the classroom. These beliefs are "assumed unreflectively, even though one's acting and thinking may rest upon them" (p. 138). Werner (1980a) states his case emphatically in quoting the findings of Downey (Note 2): "It now appears abundantly clear to us that no depth of scholarship, nor technical excellence, nor classroom expertise will serve the needs of the new...program unless the personality and disposition of the teacher are supportive of its intents" (p. 58).

Werner (1981) declares that when the beliefs of a teacher and the underlying assumptions of a program coincide, then the problem of implementation becomes primarily an administrative task of information/material dissemination. However, when program participants do not share or understand the beliefs which underlie a program, implementation becomes

an interpretive task of making beliefs explicit and modifying them to suit situations. If these beliefs are fundamentally irreconcilable, the implementation of the program may be a frustrating experience for all concerned (p. 143). Olson (1980) maintains that it might be more worthwhile to focus on the meaning system of the teachers rather than on the novelty of a new program. In other words, knowing how teachers construe their practice and make sense of new programs could be useful in facilitating implementation.

LaRocque and Oberg (Note 3) identify a shift in research orientation from how teachers behave to how teachers think. This focus on the thought processes of teachers originated in part as an effort to counteract the notable lack of success in program implementation. What teachers do is affected by what they think and if we are to understand how research is put into practice or how programs are implemented then we must know how teachers exercise judgement and make decisions. Posner (1982) supports this viewpoint by acknowledging a cognitive science perspective as a new development in curriculum research. He states that this new development consists of an emphasis on "the information processing characteristics of people and how their existing knowledge (built up from a whole life of experiences) interacts with situational demands and personal goals to affect learning, thinking, and decision making" (p. 106). In addition, Pines (1982) places curriculum and instruction within an

epistemological-psychological framework to guide theoreticians and practitioners in education.

#### Research on Person Factors in Implementation

Very little work has been done to date on the examination of person factors in the implementation process. Fullan (1983, p. 222) outlines four categories of factors related to implementation: (a) attributes of the program/model (clarity, complexity, scope, and quality of materials); (b) implementation strategies (staff development, monitoring, and feedback); (c) district and school factors (nature of adoption decision, district administration, principal, teacher-teacher relations, and parents); and (d) extraneous factors (changes in district leadership, teacher strikes, shifts in population, and funding changes). No mention is made of teacher personality itself as a possible factor. To place the present study in perspective, the findings of the research relevant to a consideration of the person factor may be grouped into three categories (a) personal orientations, (b) decision making, and (c) interrelationships between programs and people.

The research of Schienfeld and Messerschmidt (1979) can be considered as part of the first group of studies having a personal orientation focus. The thesis is that teachers have

deeply-rooted classroom ideals which govern the basic operations of the learning environment such as the social organization of the learning tasks, the content, and the scheduling (p. 300). These ideals, at the centre of a teacher's being, are the basis of personal meaning and motivation. Given that teachers tend to have fixed preferences in their manner of teaching, it is not surprising that they look for familiar elements to use in familiar ways when confronted with a new program. This idea is well expressed in Olson's (1980) statement that "an innovation is in the eye of the beholder" (p. 3).

Connelly and Elbaz (1980) suggest that personal orientations not only rest on intellectual beliefs but also on perception, feeling, values, purposes, and commitment (p. 116). That these personal components have an impact on the type of program delivery is demonstrated in a number of studies such as: (a) Brown and McIntyre (1982) showing that there is a higher degree of implementation if the teachers have a favourable attitude to the program; (b) Doyle and Ponder (1977-78) defining the "practicality ethic" whereby teachers react with pragmatic skepticism to interpret their work with reference to their own unique classroom and personal preference in the choice of teaching methods; (c) Firegold et al. (1979) asserting that there should be compatibility between curriculum materials and individual teacher orientations to subject matter and teaching

approaches; (d) Herron (1971) examining the effects of teacher perception and the points of view embodied in the materials; (e) Hughes and Keith (1980) demonstrating that the teacher's perception of the program's relative advantage, compatibility, trialability, and observability affects implementation; (f) Olson (1981) showing that teachers will implement familiar teaching practices more quickly than unfamiliar ones; (g) Tom (1973) documenting a project in which it was noted that high school teachers tend to select curricula on the basis of pragmatic criteria, favour concrete as opposed to abstract thinking, and view implementation essentially as a political process; and (h) Wahlstrom, Regan and Jones (1982) stating that teachers modify curricula to bring them in line with their own systems of belief.

Clandinin (1985) uses the term "personal knowledge" to describe the type of knowledge which includes "all that goes to make up a person" (p. 362). The central idea of the research is that teachers' classroom images are connected with the past, present, and the future, and that these images grow out of private and professional experiences. This type of qualitative, ethnographic research is further illustrated by Connelly and Clandinin (1986). They argue that extended classroom observations by the researchers yield powerful narrative accounts which may then be discussed with the teacher so that both the teacher and the researcher can see the particular classroom and classrooms in general in new

ways. This resulting growth constitutes an act of school reform (p. 309).

The work of Leithwood, Ross and Montgomery (1982) is representative of the second group of studies with a focus on decision making. The influences on teacher decisions in order of priority are (a) past experience, (b) student needs, (c) teacher attitudes and philosophies, (d) the type of students themselves, (e) personal images of what teachers ought to be doing, (f) system guidelines, and (g) availability of resources (p. 19). The study confirms the autonomy of the classroom teacher especially with reference to the nature and degree of student/teacher classroom interaction, the timing and pace of instruction, and the detailed nature of the student activities. Leithwood et al. (1982) maintain that the teachers are in the best position<sup>o</sup> to make these kinds of decisions and that curriculum intervention strategies should not tamper with this autonomy (p. 25). MacDonald and Leithwood (1982) report that the most frequent reason for curriculum choices provided by 90.1% of the respondents was based upon a need to maintain student interest or to obtain student understanding (p. 40). In other words, there is a need for the teacher to experience achievement by helping students learn. Connelly and Dienes (1982) state that the choices made by a teacher are not necessarily reasoned but intuitive. The intuitive choices arise from a personal, practical knowledge which is developed

by a view the teachers have of themselves, their situations, and their roles in these situations (p. 185).

In summary, within the first category of research which is personal orientations, the qualities represented are ideals, attitudes, practicality ethics, orientation to subject matter, perception, program familiarity, concrete thinking, beliefs, and personal knowledge. These findings are important to note because they indicate that a number of different personal qualities have an impact on program delivery. Yet they do not explain why particular teachers implement programs in particular ways. The second category of research indicates that teacher decision making is a powerful force in implementation, yet it does not explain why particular teachers make particular program decisions.

The third research group concerns the interrelationships between programs and people. Using an attitudinal questionnaire, Kremer (1978) examines the gaps between attitudes towards progressive goals and the knowledge about appropriate methods of teaching, and between these same attitudes and goal expectations ( $N = 261$ ). Her findings indicate that "teachers do not expect to attain progressive educational goals to the same extent that they express favorable attitudes to them" (p. 995). She further investigated open-mindedness and closed-mindedness as a determinant of the gap between the importance attached to progressive goals in education and the lack of implementation

of these goals. A Dogmatism Scale (Rokeach, 1960) and an attitudinal questionnaire were used to measure the relationship of open-mindedness and closed-mindedness to progressive and traditional goals and classroom observation was used to build a profile of each teacher's progressive and traditional behavior relative to the total behavior recorded ( $N = 144$ ). Her hypothesis that behavior is related to attitudes only if these are congruent with personality traits was supported. This study lends support to the hypothesis that personality factors influence teaching activities but the support is narrow in that only dogmatism is tested.

Ben-Peretz and Kremer (1979) investigate teacher characteristics and the use of curricular materials by following a biology ( $N = 24$ ) and listening program ( $N = 23$ ) at the elementary level from pre-implementation training to teacher performance in the classroom. Teacher comprehension was determined by the use of an open-ended questionnaire and teacher performance in the biology program ( $N = 6$ ) and in the listening program ( $N = 8$ ) was documented through classroom observation of the teacher statements aimed at eliciting appropriate student responses. They concluded that (a) the pre-implementation training course overlooked some distinctive curricular characteristics; (b) that teachers' perception of distinctive curricular characteristics is limited; and (c) that teacher performance is not closely related to comprehension because two curricular

characteristics may be equally well comprehended, and yet the degree of implementation may vary. They further suggest that teacher performance is determined by previous teaching experiences, general characteristics of the curriculum, and some other variables not referred to in the study (p. 254). This last conclusion is vague and suggests that more research is needed to determine factors affecting teacher performance. The sample sizes are small and the conclusions reached by classroom observation are based on the combined results of all the teacher statements. Thus, it is not possible to relate individual teacher responses to particular curricular characteristics.

Kremer and Ben-Peretz (1980) test the premise that different teacher characteristics are expected to relate to instructional differences of a listening skills program ( $N = 15$ ). The selected individual differences are seniority, knowledge, dogmatism, attitude, and locus of control. It was found that the more senior the teachers, the less they would tend to introduce changes into given materials. With reference to teaching behavior and instructional activities, knowledge was found to predict teaching behaviors better than the other variables. Dogmatism was found to explain the largest amount of variance in the implementation of the program. This personality trait affected the teacher and student roles so that teachers having high levels of dogmatism were less inclined to adopt the changes needed in

the new program. It was also found that attitudes were not effective in predicting teaching behaviors, a finding reinforced by Kremer (1978) who stated that attitudes make a difference in teaching behavior only if they are congruent with personality traits. Teachers may have favourable attitudes towards certain teaching behaviors but their personality traits may make them unable to carry these attitudes into practice. The inclusion of locus of control was aimed at gaining additional understanding of teachers' perception of success or failure in implementation. It was found that internally-oriented teachers were more likely to attribute difficulties to themselves while teachers who were externally-oriented focused on outside factors.

The above study supports the influence of personality traits on implementation although the sample size is small, and the personality traits being examined are narrow. In addition, the discussion concerning teacher seniority is not clear. On one hand, the authors state that more senior teachers are more likely to adhere to curriculum instructions and guidelines, and on the other hand, they imply that senior teachers may have more deeply-rooted habits. For practical purposes, they state that the less senior teachers may be more successful in putting new curricula into practice (pp. 76-80). Yet, if implementation is defined as adhering to curriculum instructions and guidelines, then the more senior teachers could be higher program implementers which is

a contradiction to the statement that the less senior teachers may be more successful. Further research is needed to determine if the years of teaching experience is a factor in program implementation.

As can be seen from the three categories of research, teacher perceptions of the structure, goals, and the philosophy underlying the new programs may constitute the main reasons for resistance to curricular change. Therefore, it is essential to understand how teachers view the curriculum, why they view it in a particular way, and how their perceptions influence the specific ways in which the program is delivered to the students. One way of accomplishing this is to examine the complex and subtle relationships between teacher personality style, program design, and implementation.

#### Personality Dimensions as Expressed in the Literature

It is very difficult to study personality in its totality with reference to educational issues. For this reason, different components of personality as they relate to the different aspects of teaching/learning process have been studied in depth. Guild and Garger (1985) address a variety of style differences such as learning style, cognitive style, teaching style, leadership style, and psychological type in

their work. They propose that while the names differ, many of the basic ideas are similar and that style is the most important concept to demand attention in education in many years because it is at the core of what it means to be a person (p. viii). In reviewing the literature on style differences (Dunn & Dunn, Kiersey & Bates, Mok, Gregorc, Kolb, McCarthy, Jung, Myers-Briggs, and Barbe & Swassing), Guild and Garger (1985) identify two basic thrusts which are common to the theories (a) a recognition of the person's individuality, and (b) an attempt to provide the means to act upon that recognition (p. 73). They further state that the fundamental characteristics of style differences can be divided into four categories (a) cognition (perceiving and gaining knowledge), (b) conceptualization (forming ideas), (c) affect (feeling and forming values), and (d) behavior (acting differently) (p. 6).

Keefe (1979) maintains that styles are hypothetical, persistent qualities which help to explain the process of teaching and learning. He considers learning style as a broader term encompassing cognitive along with affective and physiological styles, all serving as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (p. 4). The cognitive styles are further defined as information-processing habits (p. 8), while affective learning styles refer to arousing, directing, and sustaining behavior (p. 11). Physiological

styles such as time rhythms, and the need for mobility, light, sound, or temperature are biologically-based (p. 15).

Claxton and Ralston (1978) propose that a number of learning styles are cognitive styles rather than personality styles. They subdivide cognitive styles into three groups. The first category, defined by psychologists, is concerned with how people perceive and deal with stimuli. The second one is called student response styles, while the third consists of the integrated models of learning styles with a focus on learning theory, personality orientation, and individual development (p. 7).

In the integrated learning styles group, Claxton and Ralston (1978) include the Learning Styles Inventory (David Kolb), Cognitive Style Mapping (Joseph Hill), and the Myers-Briggs Type Indicator (Isobel Myers-Briggs). The Learning Styles Inventory, based on Jungian theory, differentiates four dimensions of learning (a) concrete experience (feeling), (b) abstract conceptualization (thinking), (c) active experimentation (doing), and (d) reflexive observation (watching). Combinations of these four dimensions result in four styles referred to as converger (thinking and doing), diverger (feeling and watching), assimilator (thinking and watching), and accommodator (feeling and doing) (p. 28). Cognitive Style Mapping includes an analysis of four aspects (a) symbols and meaning, (b) cultural determinants, (c) modalities of influence, and

(d) biochemical and electro-physiological aspects of memory (p. 33). These aspects further divide into 28 categories providing an extensive profile of cognitive characteristics (Kirby, Note 4, pp. 59-64). The Myers-Briggs Type Indicator also based on Jungian theory, can be used to structure educational endeavours (p. 43). One of the descriptors of each of the four pairs of preferences (extraverting/introverting, sensing/intuiting, thinking/feeling, and judging/perceiving) is dominant over the other resulting in sixteen different personality types.

One could debate the advantages and disadvantages of classifying learning styles as cognitive styles or personality styles. Nevertheless, a contribution made by Claxton and Ralston (1978) is the grouping of integrated models of learning styles. To this group, one could add Royce's Psycho-Epistemological Profile. According to Royce (1973), when a "style construct simultaneously invokes a valid truth criterion (i.e. leads to a justifiable knowledge claim in addition to being a characteristic mode or way of interacting with the environment), it is known as epistemic style" (pp. 330-331). Royce's profile provides information on each individual's strength in three ways of knowing (a) empiricism (knowing via sensory inputs), (b) rationalism (knowing via the formation and elaboration of concepts), and (c) metaphorism (knowing via the construction and elaboration of symbol systems) (p. 331).

Thus, a number of writers have tried to measure different aspects of different kinds of styles, all contributing to the knowledge of what makes up a person. Royce and Powell (1983, pp. 14-15) describe a comprehensive personality system which categorizes different personality dimensions in a hierarchical order: (a) the total psychological integrative suprasystem or personality is at the top level; (b) the six systems or types which compose the total system (sensory, motor, cognitive, affective, style, and value systems); (c) subclasses of the systems; (d) specific goal attainment; and (e) specific operations. The critical differences between styles and values is that styles provide focus by selecting for particular modes of cognitive and affective processing, whereas values select for informational content to which one can become committed (p. 134).

What is interesting to note is that there is a hierarchy in the personality system described above. The higher the level, the larger the proportion of "personality" being explained. It would be difficult to investigate the top integrative suprasystem level of "personality." The Learning Styles Inventory (Kolb), the Myers-Briggs Type Indicator (Myers-Briggs), and the Psycho-Epistemological Profile (Royce), all related to a Jungian approach, are instruments which measure personality at the style and value level as described by Royce and Powell (1983) above.

According to Jung (Evans, 1981; Hall & Nordby, 1973; Myers & McCaulley, 1985), personality is called the psyche or mind. This psyche is composed of three levels known as the consciousness, the personal unconscious, and the collective unconscious. Innate in all human beings is the striving for individuation or self-realization. Jung (1921/1971) describes individuation as "a process of differentiation having for its goal the development of the individual personality" (p. 448). This task is accomplished through the interaction of four mental functions: (a) sensing (conscious experiences produced by sight, sound, smell, taste, and touch); (b) intuiting (unconscious perception of ideas or associations); (c) thinking (logical process aimed at an objective, impersonal finding); and (d) feeling (logical process aimed at a personal, subjective value). The act of perceiving is made up of sensing and intuiting. When people prefer sensing, they are interested in what is tangible and real so that they have little attention to spare for ideas coming faintly out of nowhere. Those people who prefer intuiting are engrossed in pursuing the possibilities and meanings the situation presents so that they seldom look very intently at the actualities. The act of judging is made up of thinking and feeling. The people who prefer thinking are more adept in the organization of facts and ideas while the people who prefer feeling are more adept at weighing the importance of alternatives for oneself and others. All four

of these functions are a part of each person's constitution but they exist in different proportions and at different levels of consciousness. The ego, responsible for the organization of the conscious mind, provides identity and continuity for a personality type by being selective towards stimuli. It is this particular selection which accounts for the different behaviors and needs of different people.

From the above, it seems reasonable to assume that if these basic differences in perception or judgment affect behavior in general, they could also influence more specific behaviour such as program delivery. There is a need to investigate in what way personality has an impact on program implementation. This may be explored by examining the relationships between implementation, teacher personality style, and program design as discussed in chapter 3.

## Chapter 3

### Presentation of the Research Problem

The purpose of chapter 3 is to bring together some findings from the fields of curriculum implementation and psychology to articulate the research problem of the present study. This chapter is made up of three components (a) a justification of the need for the present study, (b) a theoretical framework, and (c) a description of the research problem and the hypotheses.

#### A Justification of the Need for the Present Study

According to Dillon (1984, p. 354), researchers may enhance their understanding of a particular field by arranging studies according to the questions addressed in them. A review of the literature on the person factor in implementation yields two main questions: (a) Why is there a concern with implementation? and (b) How do teachers implement a program? In looking at these two questions, the kinds of issues being discussed revolve around the definition and management of change, and how teachers go about understanding and implementing new programs. The compatibility between the program as intended and the program as perceived by specific teachers, influences the degree and type of implementation. One may ask why some teachers have

more success than others in implementing particular kinds of programs. A review of the literature indicates that looking at teacher personality style as one determinant in implementation may have some merit and potential for answering this question. Very few studies in education have been conducted to link personality with implementation, yet the studies which have been done indicate the importance of continuing research in this area. The rationale for studying teacher personality style as a factor in implementation is supported by both conceptual and research literature. One may distinguish four main themes common to this literature (a) teacher autonomy, (b) individuality, (c) professionalism, and (d) the need for self-understanding. More specific support is also provided by the research literature written on the interrelationships between programs and people.

The first theme, teacher autonomy, is a fundamental one in implementation. There may be a system in place to try to direct teacher program delivery yet the teacher is the final implementer behind the classroom door (Connelly & Elbaz, 1980; Schienfeld & Messerschmidt 1979, Common, Note 1). As the final implementer, the teacher has a particular role to play both in the implementation process itself and as implied in the program (Ben-Peretz & Tamir, 1981; Connelly and Ben-Peretz, 1980). This role is partially defined by the particular classroom and time-specific decisions a teacher chooses to make. Some writers argue that all of these

decisions may be better made by the teacher (Connelly & Dienes, 1982; Leithwood et al., 1982; Olson, 1980; Roberts, 1980; Silver & Hanson, 1982; Werner 1980b). LaRocque and Oberg (Note 3) describe three types of factors which influence teacher thinking: (a) psychological context (implicit theories, beliefs, and values about teaching and learning); (b) ecological context (resources, administrative requirements, and community pressures which shape teaching and learning); and (c) situational context (classroom realities) (pp. 2-3). Examining factors related to teacher decision making is advantageous because individual teacher differences are considered, so that the teaching process may be better understood from both an instructional research and implementation research perspective. If we are to have a clearer understanding of why programs are being implemented in particular ways, it may be worthwhile to examine why particular decisions are being made. The exploration of teacher personality style may be fruitful in understanding some of the reasons behind teacher decisions.

The second theme common to the implementation literature supporting the study of personality style is teacher individuality. Its importance lies in the fact that each teacher is unique and harbours an individual meaning system or personal philosophy (Clandinin, 1985; Connelly & Clandinin, 1985; Connelly & Elbaz, 1980; Fullan, 1982; Rokeach, 1968; Royce, 1964; Royce & Powell, 1983). In

addition, more attention has been paid to the "what" and "how" of implementation as compared to the "why." A study of teacher individuality may contribute to a greater understanding of the "why" of implementation. The teachers' personal orientations may have an impact on the type of program delivery because programs operate in accordance with the interpretations which teachers give to them (Brown & McIntyre, 1982; Doyle & Ponder, 1977-78; Finegold et al., 1979; Herron, 1971; Hughes & Keith, 1980; Olson, 1980, 1981; Tom, 1973; Wahlstrom et al., 1981; Werner, 1980a). Studying teacher individuality is further supported by Wright (1982) who identified endogenous factors as one of the six elements of the implementation process. Teacher predisposition to change, a component of teacher individuality, is one of these factors which may contribute to a greater understanding of the "why" of implementation.

Brown and McIntyre (1983) propose that an adequate understanding of educational events requires a multidisciplinary approach which includes psychological theory as a means of explaining how individuals make sense of and construe their situation. In other words, psychological theory has a part to play in explaining the adoption and implementation of innovations (p. 447). Posner (1982) states that a major recent development in curriculum research is a new emphasis on the content of instruction, individual cognitive processing (i.e. the way people, think, understand,

and make decisions), and on a broadening of acceptable research methodology borrowed from anthropology, cognitive science, and computer science (p. 107). Furthermore, this shift is based on a view of teaching and learning as rational processes accessible to researchers and fundamental for explaining human behavior (p. 109)..

The third theme supporting the study of teacher personality style is professionalism. One aspect of teacher professionalism is the ability to deliver a program in such a way that the underlying philosophy and objectives of the program are followed while at the same time changes are made to meet the individual needs of the students. An understanding of why some teachers have more success than others in delivering a particular program may contribute to a further understanding of the dynamics between teachers and programs. The ability of a teacher to deliver a program effectively may depend on the type of program being taught. In other words, the match between the teacher's personality style and the type of program may determine the extent of the teacher's ability to deliver the program as intended. Understanding the impact of teacher personality style on program delivery may contribute to the enhancement of teacher professionalism by offering some explanations for variance in implementation and by facilitating staff development opportunities to meet the individual needs of teachers.

Both positive and negative descriptions of teachers

relative to implementation are expressed in the literature. For example, Connelly and Ben-Peretz (1980) document the changing view of the teacher in implementation from that of transmitter, to implementer, and adapter. In so doing, they promote the teacher as a program adapter or as a partner in research and development, a role which demands a great deal of knowledge and expertise. On the other hand, Fritz (1981) states that much of the current research and thought implies a somewhat negative view of teacher participation in implementation by emphasizing the deficits and inadequacies of teachers. Although it may be difficult for teachers to function as professionals (House, 1974; Lortie, 1975; Oberg, 1980), they should, nevertheless, be given the opportunity to do so (Connelly, 1982; Olson, 1985; Roberts, 1980). Strategies for enhancing the professionalism of teachers are needed. Fullan and Connelly (1987) state that teachers must be in control of their knowledge and need to be viewed as knowledgeable about their teaching situations (p. 47). In addition, they need opportunities to reflect on themselves as knowing, teaching beings and to participate in a process of professional interaction, action, and reflection (p. 49). There is a need to promote the concept of the teacher as a professional partner in the implementation process, and to facilitate better utilization of individual teacher differences as a positive implementation force.

The ability to deliver a program in a professional

manner demands a high level of teacher self-understanding, the fourth theme supporting the study of personality style. Successful change can only occur if teachers are given opportunities to examine their own craft and their own beliefs (Connelly & Mandinin, 1986; Fullan & Connelly, 1987; Olson, 1980; Silver & Hanson 1982; Werner 1980a). Oberg (1980) states that the teachers' lack of critical or reflective attitude towards their own teaching may account for the relative lack of success. To counteract this, Olson (1985) stresses implementation through teacher awareness by promoting the reflexive approach to implementation. In this approach, teachers are encouraged to analyze their own ideas to make rational programing decisions. Teachers need to better understand their own practice by becoming more aware of themselves, the teaching/learning process, and the program. Hanson, Silver and Strong (1984) maintain that no fundamental educational change can be expected for any innovation unless teachers understand themselves so that they can better understand their students (p. 170). In addition, Hall and Nordby (1973) support this statement by quoting Jung as stating that the education of teachers should emphasize the prospective teacher's need to know his or her own personality (p. 87).

Support for the study of the influence of personality style on implementation comes not only from the four themes of teacher autonomy, individuality, professionalism, and

self-understanding, but also from specific research documenting the interrelationships between programs and people. The work of Kremer (1978), Ben-Peretz and Kremer (1979), and Kremer and Ben-Peretz (1980) supports the thesis that certain aspects of personality have an impact on program delivery. Kremer (1978) shows that dogmatism influences teaching activities. Ben-Peretz and Kremer (1979) indicate that teacher performance is not closely related to comprehension and that it is determined by previous teaching experiences, general characteristics of the curriculum, and other unidentified variables. Kremer and Ben-Peretz (1980) find that knowledge is a better predictor of teaching behavior than seniority, dogmatism, attitude, and locus of control, and that dogmatism accounts for the largest amount of variance in the program.

Although the above studies are supportive, they also indicate that further research on the impact of personality style on implementation is warranted. First of all, there are concerns with sample sizes being too small (Ben-Peretz & Kremer, 1979; Kremer & Ben-Peretz, 1980). Secondly, some of the results are contradictory in that Ben-Peretz and Kremer (1979) find that teacher performance is not closely related to comprehension and Kremer and Ben-Peretz (1980) find that knowledge is the best predictor of teaching behavior. One may also state that these two studies examine different kinds of programs and there may also be differences between

comprehension and knowledge so that it may not be appropriate to compare the results. Nevertheless, further research is needed to determine the impact of other variables.

The third reason supporting the need for additional research is that the aspects of personality investigated in the above studies are narrow (i.e. dogmatism, attitudes, locus of control). The fourth reason is that very little work has been done in relating specific curricular features to specific personality dimensions. The implementation findings of Ben-Peretz and Kremer (1979) relate to the combined results of all the teacher statements so that it is not possible to relate individual teacher responses to particular curricular characteristics. Clark and Yinger (1977) state that researchers on teacher thinking have made a promising start towards understanding teacher behaviors. They propose that "the most exciting possibility is that research on teacher thinking may unite the concerns of researchers on instruction and teacher behavior with those of researchers on curriculum and materials" and that "the thinking of teachers may be the strategic research site that yields the first practical theory of instruction" (p. 301). All of these concerns come together in the minds of teachers as they plan and as they execute their plans in classrooms. An emphasis on the contextual leads one to explore the possible reasons why people perceive the same situation in different ways. Thus, it is worthwhile to conduct an

empirical study to try to find out why different teachers implement programs differently.

### Theoretical Framework

Clark and Yinger (1977) also state that a common thread in the studies reviewed is "the belief that teacher thinking and teacher behavior are guided by a set of organized beliefs, often operating unconsciously" (p. 295). Werner (1981) maintains that the new goals, actions, or resources of programs may themselves be based on changed beliefs including assumptions about knowledge and knowing, expectations regarding the nature of teaching and learning, and values about what is worthwhile in the classroom. Not everyone shares the same assumptions (p. 137).

Rokeach's (1968) principle of belief congruence states that we tend to value a given belief in proportion to its degree of congruence with our own belief system (p. 83). Furthermore, each belief is made up of three components: (a) a cognitive component because it represents a person's knowledge; (b) an affective component because the belief is capable of arousing affect of varying intensity; and (c) a behavioral component because the belief, being a response predisposition must lead to some action when it is suitably activated (p. 113). In implementation terms, teachers would

be more likely to implement programs having assumptions compatible with their own teaching philosophies because people act in a manner consistent with their beliefs.

Rokeach also proposes that belief systems arising from deep personal experience are very central, stable, and resistant to change (p. 6). This observation is supported by the lack of change reflected in implementation research. Beliefs associated with the teaching/learning process are central and very resistant to change because the role of the teacher as expressed in the classroom is closely tied to self-identity and/or personality factors. Thus, in looking specifically at teacher behavior it may be possible to find evidence of differences in program delivery related to differences in personality type as defined by Jungian theory. In other words, a match between the type of program and the type of person may lead to a higher degree of implementation and a mismatch may lead to a lower degree of implementation. In order to explore this relationship more fully, it is important to define and describe each of the variables: program, implementation, and personality style.

#### Program Variable

In the present study, program or innovation refers to a written document that is intended to be used by teachers as a point of departure for instructional planning (Beauchamp,

1975, p. 7). For the purpose of this present research, it is assumed that there is a close relationship between the type of program implementation research questions posed and the type of programs being examined. This is attributable to the fact that there is no standard list of generic components or essential attributes that make up most innovations (Rutherford, Hall & Hulling, 1983, p. 141). Hall and Loucks (1981a, p. 21) state that different numbers of components have been proposed by different writers. For example, Fullan and Pomfret (1977) suggest that there are four essential program components, Leithwood and Montgomery (1980) propose eight, and the Network, Inc. (Note 5) list sixteen. The components which are generally agreed upon are: (a) a framework of assumptions (philosophy); (b) aims or objectives; (c) content or subject matter with its selection, scope, and sequence; (d) teaching strategies; and (e) evaluation.

Wright (1982, p. 154) makes a distinction between the anatomical attributes of curriculum (the philosophy and the components or the specific parts) and the ascribed attributes (practicality, clarity, relative advantage, compatibility, trialability, observability, flexibility, complexity, quality, communicability, and cost) (p. 154). Both the anatomical and ascribed attributes influence the type and degree of implementation because the perception of these attributes vary from teacher to teacher. There is a need

for investigating the relationships between programs with their own specific anatomical and ascribed attributes and the reasons for the particular teacher perceptions of these programs in order to understand implementation more fully. Since implementation requires explicit information about the programs' operating features, it also becomes important to determine the methodology for describing these programs (see Heck, Steigelbauer, Hall, & Loucks, 1981; Leithwood & Montgomery, 1980, 1982, 1987; Werner, 1980c). The innovation being examined in the present study is a Primary Environmental Studies Program having three distinct features (a) hands-on activity, (b) child-centred approach, and (c) integration. Details on identifying the features of this program will be presented in chapter 4 on methodology.

#### Implementation Variable

As mentioned previously, implementation is the operationalization of a program in a classroom. Fullan (1983) describes it as "the process of putting into practice an idea, program, or set of activities which is new to the people attempting to bring about a change. The emphasis is on what actually changes in practice" (p. 216). This change is multidimensional because more than one aspect of change is at stake (a) new materials, (b) structure (e.g. grouping, use

of teacher aides), (c) teaching approaches, or (d) beliefs (philosophical and pedagogical assumptions) (p. 217).

The measurement of implementation consists of two main steps (a) defining or describing the essential components of the program, and (b) measuring actual practice to determine how it compares to the program intent of the developers (Fullan, 1983, p. 219). Fullan and Pomfret (1977) state that if one is interested in the extent to which the program delivered parallels the program as intended, this is known as the fidelity perspective. If one wishes to document how the program becomes changed or developed during the process, this is known as the mutual adaptation perspective (p. 340). Wang, Nojan and Strom (1984, p. 276) indicate that the identification of site-specific differences in the degree of implementation suggests a need for systematic research to investigate why implementation is a success under certain conditions and not under others. In the present study, the fidelity perspective is used because there is a need to try to find out why different teachers implement programs in different ways. On the other hand, the mutual adaptation perspective may be used to document the evolution of program changes.

#### Personality Style Variable

As noted previously, personality is a complex topic

which is difficult to examine in its totality with reference to specific educational issues. "Personality" itself may be defined as the "dynamic organization within the individual of those psychophysical systems that determine characteristic behaviour and thought" (Allport, 1961, p. 28). What a person will actually do depends on enduring personality characteristics, degree of self-disclosure, perception of the present situation, and expectations associated with the situation (p. 180). Allport (1961) further states that while the situation may modify behaviour, this modification takes place only within the limits provided by the personality.

Royce and Powell (1983) define "personality" as personality type or the personality profile consisting of a total set of six systems or types known as sensory type, motor type, cognitive type, affective type, style type, and value type (p. 229). As one ascends this hierarchy (sensory/motor to cognitive/affective to style/value), the focus is increasingly on more integrative personality systems. These systems have a higher priority of action, can input control information to other systems, are concerned with longer units of time, and have a deeper significance in determining the overall personality type (p. 133).

As a subset of personality, styles may be described as hypothetical, persistent qualities (Keefe, 1979, p. 4) or as constructs to recognize a person's individuality or an attempt to provide the means to act upon that recognition

(Guild & Garger, 1985, p. 73). Integrated learning styles (e.g. Kolb, Myers-Briggs, and Royce) may be defined as styles which have a focus on learning theory, personality orientation, and individual development (Claxton & Ralston, 1978, p. 7). There are three common elements in the above descriptions of personality in general and styles in particular. One is that the different components of personality may be arranged in a hierarchical order reflecting levels of personality integration; the second is the enduring quality of particular styles; and the third is that the Kolb, Myers-Briggs, and Royce integrated learning styles are all related to a Jungian framework.

As mentioned previously, one way in which Jung (Evans, 1981; Hall & Nordby, 1973; Myers & McCaulley, 1985) classified different personality types was by determining an individual's preference for perceiving and judging. Perceiving is the process of becoming aware of things, people, occurrences, and ideas. Some individuals show a preference for sensing (conscious experiences produced by sight, sound, smell, taste, and touch) while others show a preference for intuiting (unconscious perception of ideas or associations). Judging is the process of coming to conclusions about what has been perceived. Some individuals show a preference for thinking (logical process aimed at an objective, impersonal finding) while others show a preference for feeling (logical process aimed at a personal, subjective

value).

Given the complexities of defining personality, for the purpose of this study, personality style refers to an integrative cognitive/affective system of perceiving and judging which finds its expression in characteristic behavior and thought. In other words, preferences for sensing or intuiting and for thinking or feeling influence the different behaviors and needs of different people.

#### Statement of the Research Problem and Hypotheses

Fullan (1983) states that whether a program is implemented or not depends on certain planned (strategies) or unplanned (contextual) factors (p. 217). While a great deal of energy, time, and money has gone into program improvement, the results in terms of implementation are somewhat disappointing. Traditionally, curriculum implementation research has been concentrated on strategic methods to counteract this lack of success by removing obstacles to the change process such as the lack of planning, inadequate incentives, or insufficient resources. It is often suggested that if teachers are trained to have the appropriate knowledge, skills, or beliefs, then greater implementation will occur. Such strategies have often resulted in a relative lack of success because as one tries to introduce

change, what is known and familiar to the teacher is challenged. In more specific terms, one may inquire about the reason for individual teacher responses to programs. The purpose of the present study is to contribute to an understanding of implementation issues by exploring the influence of personality style on a specific program by answering the following question: In what way does personality style have an impact on program implementation?

As noted previously, the program chosen for the present study is the Primary Environmental Studies Program. This program has three main components (a) hands-on activity, (b) child-centred approach, and (c) integration. In terms of Jungian theory, hands-on activity has a sensing focus (conscious experiences produced by sight, sound, smell, taste, and touch); the child-centred approach has a feeling focus (personal, subjective values); and integration has an intuiting focus (unconscious perception of ideas or associations). The impact of personality style on the implementation of the Primary Environmental Studies Program is examined from three levels of research proceeding from the general to the specific. Thus, the present study is organized under three research questions with their respective hypotheses and particular methodologies of operationalizing these research questions.

Research Question 1

Is the degree of program implementation a function of personality style?

Hypothesis 1

It is hypothesized that the intuitive teachers implement the program to a higher degree than the other teachers.

This hypothesis is of the confirmatory type. The major components of the program being examined are hands-on activity, child-centred approach, and integration. Integration is the most difficult aspect of the program to implement because it involves creative planning to teach through a thematic approach. The teacher's skill in making program adaptations and modifications in order to achieve integration with other subject areas is thus very important. This skill of making program adaptations and modifications is the same skill underlying the operationalization of the full use/renewal phase of the implementation of any program. With reference to the type of program being studied in the present study, it is predicted that intuitive teachers find it easier to implement the integration component which is the most difficult aspect of the program to implement.

Research Question 2

In what way does personality style influence the way a program is taught?

Hypothesis 2.1

It is hypothesized that the sensing teachers display a higher degree of fidelity to the hands-on activity component of the program.

Hypothesis 2.2

It is hypothesized that the feeling teachers display a higher degree of fidelity to the child-centred component of the program.

Hypothesis 2.3

It is hypothesized that the intuitive teachers display a higher degree of fidelity to the integration component of the program.

These hypotheses are of the confirmatory type. In general terms, it is hypothesized that the degree of fidelity to the program as intended varies with personality style.

The degree of fidelity to the program is predicted to be higher when there is a match between personality style and program component type.

The first specific hypothesis favours sensing teachers because these teachers prefer concrete exploration and manipulation as exemplified in the hands-on aspect of the program. Sensing teachers prefer to establish what exists in the present moment via their acute powers of observation using their senses.

The second specific hypothesis favours the feeling teachers because the child-centred component of the program is based on the nurturing of a positive self-concept which demands a great deal of empathy and understanding by the teachers. The feeling function is based on an understanding of personal values and group values. Teachers with a strength in the feeling function are more likely to be attuned to the values of others as well as their own.

The third specific hypothesis favours the intuitive teachers because program integration involves creative planning and the exploration of possibilities. The innate interest of intuitive teachers for possibilities beyond what is present, allows them to see relationships between the content areas so that the lessons can be more easily planned in novel and integrated ways. In other words, intuitive teachers would find it easier to teach via a thematic mode.

Research Question 3

In what way is the preference for particular kinds of teaching activities a function of personality style?

Hypothesis 3

It is hypothesized that the preference for particular kinds of teaching activities is higher when there is a match between teaching activity type and personality style.

This is an exploratory hypothesis because so little is known about the relationship between teacher preferences for activities and implementation. The question is an important one because activity choice may be considered to be on the frontline of implementation. The aim is to search for patterns and interpret them in light of the conceptual framework of the study.

Specific information regarding the operationalization of the three research questions is given in chapter 4 on methodology.

## Chapter 4

### Methodology

The purpose of chapter 4 is to report on the research methodology by describing: (a) the measurement instruments and giving a rationale for them (degree of program implementation, type of program delivery, teacher personality style, and teaching activity preference indicator); (b) the sampling procedures; (c) the rationale for program choice and methodology used; and (d) the data collection procedures. In addition, the research assumptions and limitations are stated and there is an overview of the data analysis plan.

#### Measurement Instruments

##### Levels of Use of the Innovation (LoU)

Fullan (1983, p. 219) maintains that significant advances have been made over the past five years in the technology of assessing the degree of implementation. The measurement of implementation consists of two main steps (a) defining in specific terms the essential components of the program to describe its operationalization, and (b) measuring the actual practice to determine how it compares to the program as intended by the developers. In the present study, the Innovation Configurations (IC) is used to describe the

essential program components, and the Levels of Use of the Innovation (LoU) is used to determine the degree of program implementation.

The Levels of Use Chart (Appendix A) is part of the Procedures for Adopting Educational Innovations Project which was designed at the Research and Development Center for Teacher Education at the University of Texas in Austin, Texas (Loucks, Newlove, & Hall, 1975). The conceptual basis for this research is the Concerns-Based Adoption Model (CBAM) (Hall, Wallace & Dosset, 1973) in which users progress as familiarity and expertise with the innovation develops. This generic model may be used to document the process of innovation adoption from both organizational and individual perspectives. Innovation adoption is viewed as a highly personal experience, a process through which individual teachers move in ways and at rates different from other teachers (Loucks & Hall, 1977, p. 18).

Using branching-format questions (Appendix B), decision points (Appendix A), and probing questions, one may assess a teacher's degree of program implementation by determining which of the eight discrete levels of use best describes the subject's behavior at a specific point in time. The LoU is not targeted towards describing attitudinal, motivational, or other affective aspects which are assessed by Stages of Concern, another aspect of CBAM. In order to increase reliability of the LoU, the eight levels are subdivided into

seven categories representing the key functions that users carry out when using the innovation. The levels may also be clustered into three groups each reflecting a general focus (see Appendix C for a description of the typical behaviors) (a) orienting (from nonuse to orientation and preparation), (b) managing (mechanical and routine use to refinement), and (c) integrating (collaborating with others and actively seeking alternative approaches) (Hall, Loucks, Rutherford, & Newlove, 1975, p. 52).

Individuals may exhibit certain behaviors which are of different levels in different categories. For example, an individual may have crossed decision point B by making a commitment to begin using the innovation (Appendix A) and be assigned an overall LoU II (i.e. establishing a specific date to begin use of the innovation), yet exhibit behaviors in the categories which are typically level 0 or 1. Generally, the level of the individual behaviors within each category are clustered around the overall LoU level (see Appendix D for the LoU Rating Sheet).

The rationale for choosing the LoU methodology for assessing the degree of program implementation may be described as being theoretical and practical. The LoU was chosen after conducting an investigation of available instruments in terms of the ease of administration, reliability, validity, and the purpose of evaluation (Revicki, Rubin, & Stuck 1981; Leithwood, Note 6). Fullan

and Pomfret (1977) state that the main methods utilized in the implementation studies reviewed are observation techniques, focused interviews, questionnaires, and content analysis of key documents. They also contend that of these, "the use of observation probably represents the most rigorous measurement of behavioral fidelity or degree of implementation if the innovation is reasonably well specified" (p. 365). Yet, the disadvantages are (a) some program dimensions are more difficult to assess through direct observation, (b) the effect of observers on the performance of users is not clear, (c) observation techniques may tap only the mechanical uses of the innovation, and (d) observation methods are expensive and sometimes not feasible if large samples are involved (Revicki et al., 1981, p. 67). Direct classroom observation of the teachers is not utilized in the present study because it requires extensive resources and time. In addition, some of the essential data is not readily available using the observation approach.

Revicki et al. (1981, p. 66) also contend that the reliability and validity of the self-report questionnaire data are extremely questionable because of the difficulty in measuring changes in materials, structure, and role behavior of the participants. This is primarily due to the difficulty in operationalizing and constructing unambiguous items which measure the program components, and the demands on the participants' memory of events. Likewise, there may be

difficulties when content analysis of a program's records and documents is used as an indicator of its level of implementation because the records are usually maintained by the program users who have a stake in the program's operations and outcomes (p. 67).

After examining a number of ways of gathering information on implementation, two interview methodologies were considered (a) the LoU fixed stages (Loucks et al., 1975) and (b) innovation/user profiles using stages of growth (Leithwood & Montgomery, 1980; 1982; 1987). The two criteria for making the choice were (a) reliability and validity ratings, and (b) the purpose of the interview methodologies, as compared to the purpose of the evaluation in the present study. Leithwood and Montgomery (1987) maintain that the LoU methodology focuses on what is similar in the change process and assumes there are predictable patterns of change. This generic approach is suitable for generalizing across innovations to determine the amount of use or to provide a summative assessment of such use (p. 17). The main orientation of Leithwood and Montgomery's approach (1980; 1982; 1987) is on planned strategies to increase the degree of program implementation. Preference is being given to establishing interrater reliability and validity of the innovation and user profiles (Leithwood & Montgomery, 1982, p. 165).

On the other hand, research has verified the existence

of the levels of the LoU and has explored their hypothesized sequence and factors that affect changes in the levels (Fullan & Pomfret, 1976; Hall, Note 7; LaShier, Note 8; Loucks, Note 9 as cited in Hall & Loucks, 1977, p. 265; and Loucks, Note 10 as cited in Leary, Note 11, p. 14). Loucks et al. (1975, p. 2) state that the focused LoU interview (Foster & Nixon, 1975; Merton, Fiske, & Kendall, 1956) consists of an interview guide with a list of objectives and questions but gives the interviewer latitude within the framework of the interview guide. The "interviewer is intimately knowledgeable of the objectives of the interview and is often required to use judgment in the sequencing of these questions, as well as in following up insufficient responses with further questions and probes" (p. 2). The selection of a focused interview rather than a highly structured one requiring standardized questions, probes and procedures was made because the LoU concept is too complex to be utilized in a standardized format. Since each individual responds differently in extent, as well as content, follow-up responses must be individualized. Less rigidity encourages more true-to-life detailed responses. Less structured interviews allow for standardization of meaning rather than relying on the same words to mean the same thing with each subject (Maccoby & Maccoby, 1954 as cited in Loucks et al., 1975, p. 2).

Dean, Eichhorn, and Dean (1967) document the advantages

of the focused interview over observation, namely that: (a) interviews can get at past events, at events when the interviewee is alone, and at situations where outsiders would alter behavior; (b) can reveal behavior not occurring during times when observations are made; (c) can reveal relationships that cannot be observed; and (d) are quick and efficient (Loucks et al., 1975, p. 3). In addition, to compensate for the problem of relying chiefly on self-report of the subject, the LoU interview is developed in such detail that questions can be asked about various independent yet related behaviors that contribute to establishing the overall level of use. If a number of questions are asked that differ in form and content but are related in a logical fashion, then a high correlation between responses to these questions indicates that they tap a common characteristic (Maccoby & Maccoby, 1967, as cited in Loucks et al., 1975, p. 3).

In LoU research, an individual's responses to the interview questions have been found to be highly correlated ensuring that they measure what they purport to measure (Loucks et al., 1975, p. 3). Hall and Loucks (1977) report estimates of the construct validity of the LoU interview at .98 (p. 268) using a full day observation ethnographic approach and LoU ratings. Consensus ratings of independent readers of the observation protocols were also compared with the consensus LoU ratings. The coefficient for this comparison was .65. In addition, they report inter-rater

reliability ranging from .87 to .96 on the overall level of use (p. 267). Given the above edumetric qualities, it was decided to use the Levels of Use of the Innovaton for the present study.

### Innovation Configurations (IC)

The IC is also part of the Procedures for Adopting Educational Innovations Project. Heck, Steigelbauer, Hall and Loucks (1981, p. 11) state that in the original studies designed to verify the variability of the LoU levels, it was necessary to distinguish between users and nonusers because some individuals were claiming not to be users and were actually doing many of the same things the users were doing and vice versa. Since an initial step in the LoU interview is to determine if the subject is a user or not, it became very important to set up a minimum criteria for being a user. The criteria would specify the minimum parts or components of the innovation which a person would have to be using in order to be classified as a user. Out of this experience of defining minimum use, the concept of the Innovation Configurations Checklist (a profile of operational patterns of innovations) began to emerge. In the LoU manual (Loucks et al., 1975), it is stated that "since information about variations in the form of use of an innovation is easily

elicited in a LoU interview and provides rich information to researcher and administrator alike, it is suggested that a limited effort be made to gather configurational information" (p. 32); and that although it is possible to conduct a LoU interview without using the IC, gathering information on what the individual is using, and the strategies and procedures chosen to use it, "provides valuable information that can be as easily gathered as not" (p. 31). If one chooses to use the IC, the checklist itself must be designed (described in the section on procedures) and then integrated into the focused interview procedure of the LoU.

The IC methodology is used in the present study for two reasons: (a) it is a part of the Procedures for Adopting Educational Innovations Projects along with the LoU interview; and (b) because the research questions are concerned not only with the degree of program implementation, but also in what way programs are implemented. Hall and Loucks (1981a) give an overview of six orientations which have been used to define innovations in the literature: (a) perceived attributes, a methodology for addressing program diffusion or communication (i.e. relative advantage, compatibility, complexity, trialability, and observability); (b) philosophy, an approach for understanding a program (i.e. values or fundamental beliefs); (c) goal and outcomes, a methodology for validation purposes; (d) implementation requirements, an approach for beginning implementation or

further implementing a program (i.e. steps, procedures, resources); (e) functions, a methodology which results in a more generic description of the program (i.e. determination of features which are exclusively part of the specific innovation); and (f) behaviors (i.e. identification and description of the program as delivered) (p. 7-11).

The IC's behavioral orientation can be used to operationalize the second research question of the present study: In what way does personality style influence the way a program is taught? Heck et al. (1981) contend that using an IC allows "the emphasis to be placed upon the concrete and more tangible operational forms of the innovation thereby increasing the possibility of having reliable and valid information about the use of the innovation" (p. 6). One may thus look at the effects of contextual conditions on innovation use (Hall & Loucks, 1981a, p. 27) thereby showing how innovations can be made operational in different ways (Hall & Loucks, 1981b, p. 47). This is done by identifying the major features (critical components) of the innovation (materials, teacher behaviors, or student activities) and the variations of these features so that a profile (innovation configuration) of individual users can be determined.

The present study is limited to one program only at the primary level for practical and theoretical reasons. From a practical point of view, a team approach would be needed to

conduct implementation research on a number of programs using the methodology as outlined. From a theoretical point of view, it may be assumed that if personality style influences the type of program delivery, it may also affect subject specialities chosen by teachers. This has been empirically proven in studies involving medical students and their chosen specialties (McCaulley, 1981, p. 319). Therefore, it might be more difficult to find a sample with a cross-section of types at the high school level where teachers tend to specialize in particular subject areas. It could also prove to be more difficult to separate out the influence of personality style on subject speciality from personality style and degree of implementation. At the primary level, the main emphasis is on a specialization for teaching primary children rather than for particular subject expertise.

#### Myers-Briggs Type Indicator (Form G)

The Myers-Briggs Type Indicator (Myers, 1962; Myers & McCaulley, 1985), a 126-item questionnaire (Appendix E) based on the theory of psychological types described by C.J. Jung (1921/1971), was first published as a research tool for professionals interested in the study of human behavior. In 1975, after considerable research, the MBTI was considered ready for practical applications (Lawrence, 1982, p. 14).

Its purpose is not to measure people but to sort them into groups. It is a nonjudgmental, self-report instrument intended to be used with "well" people and developed by Isabel Myers, and her mother, Katherine Briggs, studying normal people in their day-to-day lives (Hirsh, 1985, p. 12). The nucleus of the theory is that seemingly random behavior is actually quite orderly and consistent, and the basic differences in behavior are due to the different ways people prefer to use their minds.

According to Jung, the four ways people make decisions are called preferred psychological functions: (a) sensing (conscious experiences produced by sight, sound, smell, taste, and touch); (b) intuiting (unconscious perception of ideas or associations); (c) thinking (logical process aimed at an objective, impersonal finding); and (d) feeling (logical process aimed at a personal, subjective value). Two of these functions are perceiving functions (sensing and intuiting) and two are judging functions (thinking and feeling). Jung calls perceiving, the process of becoming aware of things, people, occurrences, and ideas, an irrational function because it requires no reason. The judging process of coming to conclusions about what has been perceived is called a rational function (Hall & Nordby, 1973, p. 99). Together perception and judgment govern much of the behavior because perception by definition determines what people see in a situation and their judgment determines what

they decide to do about it. The two kinds of perception and the two kinds of judgment compete for a person's attention and most people, from infancy up, enjoy or prefer one way of perceiving and one way of judging over the other.

In addition to preferences for perceiving and judging, Jung also states that individuals display different attitudes to life, a preference for extraversion or introversion. This preference indicates the source of an individual's energy. According to Jung, "psychic energy expresses itself in the form either of actual or of potential forces which perform psychological work. Perceiving, remembering, thinking, feeling, wishing, willing, attending, and striving are psychological activities just as breathing, digesting, and perspiring are physiological activities" (Hall & Nordby, 1973, p. 59). Extraverts find energy in things and people in the world outside of themselves. They are pulled by this outer life of action and spend less time with thoughts and concepts. Introverts find energy in their inner world of ideas, concepts, and abstractions and seem to require less of the outside world.

In Jungian terminology, attitudes to life are restricted to extraversion and introversion. In MBTI terminology, another attitude to life, or a way of relating to the outside world is judging and perceiving (Myers & McCaulley, 1985, p. 293). The importance of judgment and perception is implicit in Jung's work and was made explicit by Myers and

Briggs in the development of the MBTI. Behavior is thus determined by the interaction of the four attitudes known as extraversion (E), introversion (I), judgment (J) and perception (P); and the four psychological functions called sensing (S), intuiting (N), thinking (T), and feeling (Appendix F). The perceiving or judging attitudes describe an individual's orientation to the outer or extraverted world. Those who prefer to use the perceptive attitude, tend to be spontaneous, curious, and open to new events and changes. Those who prefer to use the judging attitude tend to be organized, purposeful, and decisive. Most people find one attitude more comfortable than the other. The preference for coming to a conclusion quickly and cutting off perception, or for allowing for more information to come in and cutting off judging, creates the difference between the judging people who aim to regulate and control their lives and the perceptive people who aim to understand life and adapt to it (Myers & Myers, 1985, p. 9).

The four indices, EI, SN, TF, and JP (Note 11), combine to produce sixteen personality types (Appendix G) with each type representing an individual's preference in each of the four indices. The intent is to reflect a habitual choice between alternatives, analogous to right-handedness or left-handedness. One uses both hands, but may reach first with the preferred hand. Similarly, each individual is assumed to use both poles of each of the four indices, yet

responds first or most often with the preferred functions and attitudes (Myers & McCaulley, 1985, p. 3). A preference in each of the four indices gives rise to a type profile which can be expressed by a sequence of the four corresponding letters, known as a type formula providing a compact definition for each type. For example, an ESTJ individual is an extraverted sensing thinking judging person. Writers may focus on specific characteristics by referring to one, two, three or all of the letters. It is further assumed that all types are valuable and necessary (Myers & McCaulley, 1985, p. 4; Hammer, 1985).

While the letters indicate the direction of the preference, the numbers or scores on the indicator show the strength of each of the preferred attitudes and functions (Note 12). According to theory, each individual has a dominant or governing function. In addition, Jung mentions an auxiliary function but does not describe it in detail (Myers, 1985, p. 17). Myers and Briggs developed a dynamic representation of the MBTI types so that each person could be described as having a dominant function, an auxiliary function, a third function, and an inferior function (see Appendix H for an explanation of the process to determine dominant and auxiliary functions). For all types, the dominant process is used in the preferred introverted or extraverted world. The auxiliary process provides balance to the personality and is used in the other less preferred

world. Balance does not mean equality of two functions or two attitudes. Instead, it means superior skill in one supplemented by a helpful but not competitive skill in the other (Myers & McCaulley, 1985, p. 67). In summary, the MBTI contains four separate indices designated as EI, SN, TF, and JP. Two of these, SN and TF, reflect the basic preferences for use of perception and judgment. The other two, EI and JP, reflect attitudes or styles of orientations to the inner and outer world. Together, these functions and attitudes influence how a person perceives a situation and decides on a course of action.

The rationale for choosing the MBTI for measuring personality style may be described as being theoretical and practical. The MBTI was chosen after an investigation of available instruments was conducted with reference to the definition of personality style in this study, the purpose of the evaluation, reliability and validity, and ease of administration. As noted previously, personality style as utilized in this study is based on Jungian psychology. It is defined as an integrative cognitive/affective system of perceiving and judging which finds its expression in characteristic behavior and thought. In other words, preferences for sensing or intuiting and for thinking or feeling influence the different behaviors and needs of different people.

As noted previously, "personality" itself is a complex

topic which is difficult to examine in its totality with reference to specific educational issues. More specifically, in reviewing the literature on style differences, Guild and Garger (1985) note that while the terms learning style, teaching style, cognitive style, leadership style, and psychological type differ, many of the basic ideas are similar (p. viii). Claxton and Ralston (1978) propose that a number of learning styles are cognitive styles and one group, that of integrated learning styles, has a focus on learning theory, personality orientation, and individual development (p. 7). The idea of integration is significant because as one ascends the hierarchy of personality systems from sensory/motor to cognitive/affective to style/value, the focus is increasingly on systems which are more important with respect to the processes involving personality integration. The style/value systems have a higher priority of action, can input control information to other systems, are concerned with longer units of time, and have a deeper significance in determining the overall personality type (Royce & Powell, 1983, p. 133).

The integrated learning styles related to a Jungian approach at the style/value level, are the Learning Styles Inventory (Kolb), Myers-Briggs Type Indicator (Myers-Briggs), and the Psycho-Epistemological Profile (Royce). The MBTI was chosen because of its applicability to the research questions of the present study. The Learning Style Inventory is not as

applicable. It differentiates four styles known as converger (thinking and doing), diverger (feeling and watching), assimilator (thinking and watching), and accommodator (feeling and doing) (Claxton & Ralston, 1978, p. 28). It would be difficult to exemplify the watching and doing aspects of the instrument in program design components.

Royce's (1973, p. 331) epistemic styles provide a profile of each individual's strength in the three ways of knowing which are (a) empiricism (knowing via the sensory inputs), (b) rationalism (knowing via the formation and elaboration of concepts), and (c) metaphorism (knowing via the construction and elaboration of symbol systems). The ways of knowing could be exemplified in program design components but this approach does not measure personality integration to the same extent as the MBTI. As mentioned above, the integrated learning styles are at the style/value level. Royce and Powell (1983, pp. 133-134) state that styles and values provide the direction and attentional focus required by the lower-level systems of sensory, motor, cognition and affect. They are similar inasmuch as they both provide conceptual linkages between cognition and affect. However, the critical difference is that styles provide directional focus by selecting for particular modes of cognition and affective processing, whereas values select for informational content, the items in the world to which one can become committed. Values include intrinsic, self, and

social aspects of the individual being more goal-directional and consisting of interests and needs (p. 260). The Psycho-Epistemological Profile is a style instrument while the MBTI with the inclusion of a feeling component emphasizing subjective personal values, may be described as a style/value instrument. Myers and McCaulley (1985) state that people differ in their perceptions and judgments and these differences as measured by the MBTI result in different reactions, interests, values, motivations, and skills (p. 1).

In addition, Pines (1982) distinguishes between curriculum development on one hand, and instructional planning on the other. He places both curriculum and instruction within a broad epistemological-psychological framework to guide theoreticians and practitioners in education. According to Pines (1982, p. 88), the substantive and methodological structures of all disciplined knowledge, reside in scientific disciplines. In dealing with curriculum development, epistemological considerations are central. On the other hand, in order to accomplish successful instruction, the psychological structure of the individual student must be taken into account. In the present study, it is argued that the psychological structure of the teacher must be taken into account to facilitate implementation. Pines (1982) further states that as one moves into the epistemological domain, the content is more relevant to curriculum theory and development; and as one moves into

the psychological context one is dealing with instructional theory and planning (p. 89). Thus, Royce's (1973) Psycho-Epistemological Profile may be more valuable in research on curriculum development while the MBTI may be better suited to implementation studies.

Another reason for choosing the MBTI is that the research questions of the present study are directed not only to the degree of program implementation, but also to the impact of personality style on teaching activity choice. The Jungian framework underlying the MBTI classification of personality types may be applied to the classification of program types.

Furthermore, the MBTI was chosen not only because it is at the style/value level of personality integration and because it best answers the research questions posed, but also because of its extensive utilization (i.e. education, counselling, career guidance, management, and communications). As a measurement individual differences in basic functions and attitudes, it may be applied to a wide range of human activities, especially in the field of education (Cohen, 1981; Hoffman & Betkouski, 1981; Lawrence, 1984; McCaulley, 1980; McCaulley & Natter, 1980). Carskadon (1985, p. 57) notes that by conservative estimates, the MBTI is administered over one million times per year. With reference to teacher characteristics, the use of the the MBTI has indicated that:

1. Teachers of different personality types prefer different kinds of teaching situations: (a) prospective F teachers are more interested than Ts in teaching at the lower levels; (b) ETs are more interested in administration than IFs; (c) Ns have a stronger need for creativity and independence than Ss; and (d) Ns are more interested in working with small groups than Ss (Carlyn, 1976); and (e) Ss and Es prefer the laboratory approach in teaching mathematics more than the Ns or Is; (f) Es prefer self-paced instruction more than the Is; and (g) the Ps find questioning techniques more useful than the Js (Rudisill, 1972).

2. Teachers of different personality types tend to prefer certain classroom values: (a) Ss are more partial to laughter and fairness than Ns; (b) Ss do not like fear, chaos, disorder, and favoritism; (c) Ns do not like alienation, dominance, and dogmatism; and (d) Ns are more likely to use positive words to describe gifted students (Dettmer, 1981).

3. Teachers' attitudes toward a learning activity can be improved by designing learning activities well-matched to their type (Conwell, 1983).

4. Teachers of different personality types have different control needs: (a) IS teachers are more

controlling of activities; (b) Ns move more freely about the classroom; (c) Fs attend to pupils closely and give more positive feedback; (d) NFPs show more nonverbal disapproval; and (e) Ns allow more individual activity (DeNovellis & Lawrence, 1983).

5. Teaching may be influenced by personality type in terms of the way teachers experience their roles, plan their work, teach, and evaluate their students (Thompson, 1984).

With reference to the edumetric properties, the reliability of the MBTI has been found to be satisfactory (Carlyn, 1977; Carskadon, 1979, 1982b, 1983; McCarley & Carskadon, 1983; Myers & McCaulley, 1985) and a review of the relevant studies can be found in McCaulley (1981). Research on reliability has been conducted on the continuous scores with results generally in the .80 to .90 range, and on the type categories themselves with lower results. McCarley and Carskadon (1983) report that the percentage of subjects scoring the same on the EI, SN, TF, and JP scales ranges from 77% to 92%. Considering all scales combined, the range is from 47% to 53%. The percent of test-retest agreement in each scale is closely tied to the strength of preference on the MBTI. The percent of test-retest agreement with a low preference (score from 0 to 15) generally ranges from 60% to 70%; with a moderate preference (score from 16 to 29) it

ranges from 80% to 90%; and with a strong preference (score of 31 and over) it ranges from 90% to 100% (Myers & McCaulley, 1985, p. 174).

In addition, Howes and Carskadon (1979) show that experimentally induced changes in mood do not affect the test-retest reliability of the MBTI. Parnham, Miller, and Carskadon (1984) indicate that instructional set regarding job types or life types do not affect the results of the MBTI. There has also been some discussion regarding lower test-retest reliability for males on the TF scale (Carskadon, 1977, 1979) and then a reversal of this finding (Carskadon, 1982b). Larger scale research is thus warranted to determine sex differences on the TF scale. In addition, it is interesting to note that no research adequately tests the assertions regarding dominant and auxiliary functions (Devito, 1985, p. 1030).

The MBTI manual (Myers & McCaulley, 1985) includes evidence for validity from type distributions, correlations of MBTI continuous scores with other scales, comparisons of MBTI types with self-estimates, studies of behavioral differences of the types, and studies of creativity. Further support for content and predictive validity is found in Carlyn (1977) and Carskadon (1982a); and for construct validity in Carlyn (1977) and Thompson and Borello (1986). From all of the above, one may conclude that the use of the MBTI is appropriate for the present study. Devito (1985)

states that the MBTI merits more serious consideration. The introduction of Form G and a forthcoming revision of the manual (Myers & McCaulley, 1985) will result in even more widespread use of the instrument (p. 1032).

#### Teaching Activity Preference Indicator (TAPI)

After reviewing the literature and consulting some writers in the field (Note 13), it was determined that an instrument for showing teacher preference for different kinds of teaching activities using a Jungian framework did not exist. The Teaching Activity Preference Indicator is a 20-item questionnaire designed by the researcher to answer the third research question of this study: In what way is the preference for particular kinds of teaching activities a function of personality style? The details concerning the design, reliability, and validity of this instrument are found below in the preparation for data collection section.

#### Target Population and Sample

The factors which were influential in determining the sample for the present study are type of teaching assignment, sample size and representativeness, characteristics of the

MBTI, years of experience with the program, and practicality. Once the Primary Environmental Studies Program was chosen, then the number and type of classes in a large school board having both rural and urban populations was determined: grade 1 (43), grade 1/2 (16), grade 2 (29), grade 2/3 (13), grade 3 (33), and grade 3/4 (12). Of these 146 classes, 2 were overlay at the grade 2/3 level and 14 were overlay at the grade 3 level. The teachers of these 16 overlay classes were not asked to participate because overlay classes have a different teacher teaching one-quarter of the day thereby reducing program integration opportunities, which is an important expectation of the program itself. In addition, one grade 1/2 class and one grade 2/3 class were eliminated because these classes were in the researcher's home school resulting in a potential sample of 128 teachers. Instead of using a random selection process, all of these teachers were invited to participate because of a concern for sample size. Of this group of 128 teachers, 99 chose to participate (77.4%).

Although the sample was not randomly selected from the population, the representativeness of personality types in the sample for the population as a whole was tested by comparing the frequency of personality types of the individuals who chose to participate ( $N = 99$ ) to the frequency of personality types in a large known random sample of elementary teachers ( $N = 804$ ). Since Canadian norms are

not yet available, the American norms from the MBTI data bank were used (Appendix I). The distribution of type of the sample of the present study was thus compared to a large group of elementary teachers. Using a Selection Ratio Type Table Program (Appendix J), the results indicate that there is no statistically significant difference between the two groups in any of the sixteen personality style categories. Thus, the subjects of the present study may be considered representative of the population from which they were drawn.

It is also important to note that the MBTI data bank does have a bias toward introversion and intuition, the two preferences most associated with attraction to higher education (McCaulley, Macdaid, & Kainz, 1985, p. 3). This is not a serious concern, since there are tables specifically for elementary teachers. Yet, the records also show that in general, information for subjects over 40 years of age account for only 13% of the data bank (McCaulley et al., 1985, p. 4) while the cumulative percent of the subjects in the present study having 14 years of experience is 53%. (the approximate age being 35) (see Appendix L for the raw data of the present research).

The sample of 99 teachers was stratified into 4 groups designated as ST (20), SF (41), NF (29), and NT (9) with the dual aim of having equal-sized cells and subjects with strong preferences. Thus, a deliberate selection process was used rather than a random selection process. The decision to

choose subjects with the strongest preference possible was made because a stronger preference is related to higher test-retest reliability (Howes & Carskadon, 1979). The research advantages in making a selection according to the strength of the preference scores on the MBTI outweigh the loss of statistical aspects of bias-free selection.

It was decided to investigate the relationship between implementation and personality style as defined by the SN and TF functions first because these functions best operationalize the research questions of the present study. In addition, Myers considered these functions to be the most important of the groupings of the types (Myers & McCaulley, 1985, p. 33). In terms of strength of preference, the best choice seemed to be to begin by including the subjects exhibiting at least a clear preference on the SN (scores of 21 and over) and then the subjects with a moderate preference on the SN (scores of 11 to 19) (Myers, 1971, p. 4; Myers & McCaulley, 1985, p. 58; Note 14). The process was then repeated for the TF function keeping in mind that the best selection would be strong preferences on both of these functions.

The resulting sample ( $N = 60$ ) consists of 17 ST, 20 SF, 20 NF, and 3 NT subjects having one or two years of experience with the program. One of the options was to remove all first-year users and try to maintain a larger sample size by including some subjects with weaker

preferences: 15 ST (1 weak on the SN); 20 SF, 19 NF (4 weak on the SN), and 8 NT (4 weak on the SN). The other option was to remove all first-year users and subjects with weaker preferences while attempting to have equal-sized cells: 15 ST (1 weak on the SN), 15 SF, 15 NF, and 3 NT. Neither of these two options was chosen because of a concern for preference strength or with sample size. Nevertheless, it is important to note that in the final selected sample, 6 of the 17 ST subjects exhibit a weak preference on the T function (defined as a score between 1 to 9 in the present study), but it was decided to include them because of a need for representation of the ST group (see Appendix M for a table of the subjects' MBTI preference strength on SN and TF functions). All of the subjects of the selected sample agreed to participate except for one SF individual who was replaced by another SF subject.

Rutherford et al. (1983, p. 138) state that as the use of an innovation begins, management concerns become more intense and personal and informational concerns begin to decrease in intensity. With practice and experience, the various impact concerns (levels IVb, V, and VI in Appendix C) may increase in intensity. It was decided to include 15 subjects with one year of experience along with 45 subjects with two years of experience because of a concern with sample size and because of their strong preference on the MBTI. Another consideration is that it usually takes 3 to 5 years

to approximate full implementation of a program (Note 15) so that a one year difference may not prove to be critical. It is also important to note that the Primary Environmental Studies Program chosen is not entirely "new," having been redesigned from programs which had been in use for approximately 10 years. In addition, some of the components being analyzed are not program-specific thereby reducing the concern for controlling for program experience and increasing the potential for generalizability by inference. Nevertheless, the data analysis plan includes finding out whether one or two years of program experience results in significant differences. The final consideration made was in terms of practicality. It was determined that it is realistic and possible to gather data from 60 subjects by questionnaires and interviews.

#### Rationale for Program Choice and Methodology Used

The two main aspects of operationalizing the research questions of the present study were the choice of program itself and the creation of a specific methodology to answer each of the research questions (Table 1). The Primary Environmental Studies Program was chosen for three reasons. First, it is a relatively new program (1985) incorporating the latest ministry trends. The older version of the program

Table 1

Research Questions and Corresponding Methodology

| Question  | Method  |
|---|---|
| 1. Is the degree of program implementation a function of personality style?                                   | focused interview (LoU)<br>questionnaire (MBTI) |
| 2. In what way does personality style influence the way a program is taught?                                  | focused interview (IC)<br>questionnaire (MBTI)  |
| 3. In what way is the preference for particular kinds of teaching activities a function of personality style? | questionnaire (TAPI)<br>questionnaire (MBTI)    |

Note. LoU = Levels of Use. MBTI = Myers-Briggs Type Indicator. IC = Innovation Configurations. TAPI = Teaching Activity Preference Indicator.

was more content-oriented and consisted of three separate programs (science, social studies, and health) while the new one has a more integrated approach. Second, the format of the program itself (divided into units, each having specific teaching activities) facilitated the operationalization of the research questions. And third, since it is a program used in the researcher's own board, it was predicted that there would be wide access to subjects, program writers and consultants. This proved to be correct in that 99 out of 128 teachers chose to participate. The principals and teachers were most cooperative in rearranging schedules to facilitate the interviews during school hours, and the program writers and consultants were also very generous with their time.

After choosing the Primary Environmental Studies Program, the next step was to determine specifically in what way the program was to be used. As mentioned previously, the Primary Environmental Studies Program was created using the content from three programs (science, social studies, and health) which had been in effect for approximately 10 years. Thus, some of the units have more of a science, social studies, or health focus than the others in spite of the attempts of the program writers to create an integrated program. The format of most of the units consists of a short rationale, key concepts, and a focus on skill-related suggested activities. There are a number of these units for each grade: 15 units (grade 1), 16 units (grade 2) and

16 units (grade 3) (see Appendix N for an overview of the units and a sample from the grade one program). There are also one or two units in each grade adapted from a science text. These units were not considered because the formats are different.

A content analysis of the program was conducted to operationalize the first research question. One of the considerations was whether to measure the degree of implementation of different kinds of units or to measure the degree of implementation of the program as a whole. To answer this question each suggested teaching activity in the program was classified as an ST, SF, NF, or NT activity (see Appendix O for the model of classification). The results of the content analysis indicate that the program is predominately ST since approximately one half of all the activities can be classified as such. In the cases where the activity could be classified as more than one type, each type was counted in the total. The option of conducting a LoU interview to measure the degree of implementation of different kinds of units was eliminated because the only clear type represented by the units in a consistent manner was the ST. In other words, it would be very difficult to classify units as being predominantly ST, SF, NF, or NT since NT activities are generally underrepresented and since there is a mix of activities in most of the units (Appendix P). Thus, it was decided to conduct a LoU interview on the

program in general rather than on different kinds of units to answer the first research question.

For the second research question, it was decided to use an innovation configurations checklist to relate the type of program delivery to personality style. The advantage of using the Primary Environmental Studies Program to answer this question is that the critical components (hands-on activity, child-centred approach, and integration) are not program specific which increases the generalizability of the results by inference to other types of programs.

The process of classifying the teaching activities of the program (Appendix O and P) was very useful in the operationalization of the third research question. The Teaching Activity Preference Indicator was designed using this process, and the items consist of suggested activities from the program itself to find out if preferences for different kinds of teaching activities are a function of personality style. Further details concerning this methodology are provided in the section on the TAPI below.

#### Preparation for Data Collection

#### Preparation for the Levels of Use Interview

The LoU interview procedure is fairly complex and

demands a clear understanding of interview objectives, categories, decision-points, procedures, and questions (see Appendix Q for the LoU interview questions). The LoU manual (Loucks et al., 1975) is very well written and includes guidelines for rating because a framework alone cannot provide all the information necessary for making decisions about individuals. Thus, each Level of Use and Decision Point (see Appendix A, B, C, and D) are discussed in detail and examples are given (pp. 169-255). Specific steps are taken to adapt the generic LoU interview procedure to a particular program. This requires knowledge about both the LoU interview process and the program itself. Thus, a content analysis of the program was conducted to examine the rationale, objectives, and format of the Primary Environmental Studies Program. In addition, meetings were held with the chairperson of the program development committee, another member of the writing team who became responsible for the implementation of the program, and the primary consultant of the board. The questions chosen for these interviews (Appendix R) were based on the program itself and suggestions from the IC manual (Heck et al., 1981). Approximately six hours of interviews were taped and a description of the program was produced which included general information on the program and its components.

Another requirement in adapting the LoU interview to a specific program is a decision on whether to include the

innovation configuration checklist. As mentioned previously, it was decided to use the LoU interview to answer the first research question (Is degree of implementation a function of personality style?) and the IC profile to answer the second research question (In what way does personality style influence the way a program is taught?). Having made this decision the rest of the preparation for the LoU interview consisted of developing the innovation configurations checklist (described below), and the probing questions to integrate the IC procedure with the LoU format.

#### Development of the Innovation Configurations Checklist

After conducting a content analysis of the Primary Environmental Studies Program, it was determined that this program is not an innovation bundle (multiple innovations in one program) (Loucks et al., 1975, p. 32) but one program with a number of critical components (major operational features of a program which describe how it is used). The fact that the main components of the program can be considered to be critical components rather than independent processes or ideas requires one general LoU interview on the entire program rather than a number of LoU interviews. The next step was to develop the IC checklist.

Innovation configurations may be defined as the

operational patterns of the innovation that result from selection and use of different innovation component variations (Heck et al., 1981, p. 19). Each critical component may be divided into two or three dimensions. Each dimension is made up of three or four variations which describe the potential operationalization of the dimensions in the classroom. Hall and Loucks (1981b) state that the key to successfully identifying an IC is to follow the steps through interactions with others since experience suggests that it cannot be done alone (p. 49). The major steps are selecting a perspective, identifying the innovation components, refining the checklist, testing the checklist, and finalizing it (Heck et al., 1981, pp. 21-41). The perspective in developing a checklist could be that of the developer, user, or evaluator. It was decided to use multiple perspectives in the present study to reflect the teacher behaviors and program activities from more than one point of view.

Once the perspective was chosen, the next major step was to identify the critical components of the program. This was accomplished by interviewing developers and users. Thus, a second interview phase was planned which included a second interview of the three individuals in phase one plus three more developers. The questions for this second interview (Appendix S) were based on the probing process described in the IC manual (Heck et al., 1981, pp. 138-153).

Approximately twelve hours of interviews were taped and analyzed and the original program description was expanded to include specific information on the critical components and dimensions, and variations of these components to describe ideal, acceptable, and unacceptable implementation. The researcher also chose to ask the following question: If you were interested in finding out if the \_\_\_\_\_ approach was being used, what questions would you ask? This was not a suggestion from the manual, but it proved to be very useful to design the probing questions to be used along with the innovation configurations checklist. The final steps were to produce the checklist, validate it with developers and users, refine it, and check it again (see Appendix T for the IC interview questions and Appendix U for the IC checklist). It is important to note that the IC was further validated during the data collection process with the first ten teachers. Minor refinements were made at this time so that the same procedures were followed in all 60 interviews.

The IC development process resulted in the definition of three critical components each with two or three dimensions: (a) hands-on activity (kinds of materials, student/teacher handling of materials); (b) child-centred approach (kinds of student choice, type of planning, classroom setup); and (c) integration (kinds of integration, scheduling, and use of activity centres). These components may be classified as being generic rather than specific

because they may be the essential components of other types of programs. Once the IC was fully developed it was integrated with the LoU interview and the TAPI questionnaire. The entire process was piloted with one teacher to decide upon the ordering of the questions and to check out the timeframe needed for the total interview.

#### Researcher Reliability with the LoU and the IC

For the purpose of experimentation, it is necessary to determine researcher reliability on the LoU and IC ratings. If at least two raters agree on a rating of a tape, then this agreement is considered to be the final rating (Loucks et al., 1975, p. 45). Since the LoU and IC interview process demands specific expertise and knowledge, the appointment of another rater must be done very carefully. One of the authors of the IC manual agreed to act as a rater on both the LoU and IC portions of the interviews. This rater was given a copy of the interview questions and IC checklist. In addition, a summary of the program description was also given because the LoU/IC procedure requires a sound knowledge of both the interview process and the program being examined. Fifteen tapes were selected at random with replacement to measure the reliability. The rater and the researcher agreed on 14 out of 15 tapes (93.3%). In the one disagreement, the

rater had assigned one of the subjects a level V, and the researcher had assigned this subject a level VI on the LoU. Subsequent to a discussion, it was decided to leave it at level VI.

The same tapes were used to assess the researcher reliability on the IC. Assessments were made of the variations for 8 categories per subject: hands-on activity (2), child-centred approach (3), and integration (3) for a total of 120 items of information (see Appendix U for the IC checklist). The researcher and rater agreed on 108 (90%). Of the 12 in disagreement, 6 would not be a concern because for analysis purposes some of the dimensions were collapsed which would bring the level of agreement to 95% (see Appendix V for the raw data on researcher reliability). It was decided to let the researcher ratings stand because the IC procedure requires an in-depth knowledge of the program.

#### Development of the Teaching Activity Preference Indicator

Using a Jungian framework, the Teaching Activity Preference Indicator was developed to measure the relationship between preference for teaching activity types and personality style. A second reason for designing the TAPI was to investigate the influence of the dominant function as measured by the MBTI because this function has not been researched extensively (Devito, 1985, p. 1030). The

dominant function has been described as the governing force which unifies one's life, the best developed or most used process, the "ship's captain" (Lawrence, 1983, p. 25). A third reason was that activity choice can be considered to be the frontline to implementation. This is very important because the most frequent decisions made by teachers are about activities and content (Oberg, 1980, pp. 56-57).

One of the options in the design was to try to find out if the teachers maintained their preference for particular kinds of activities across the units. The plan was to compare the total number of types of activities chosen to the total number of different types of activities available in each unit. This option was eliminated because: (a) the program does not have a balance of activities across the units or within the units (Appendix P); (b) there was a problem of controlling for which units were taught and which ones were not, and having to rely on the teachers' memory regarding the type of activities chosen; (c) the actual choice and number of activities may have been influenced by a number of constraints such as the lack of materials, support, or the ability of the students; and (d) there was also a concern with having too long an interview to gather this type of information. Extensive work has been done on teaching style and learning style using Jung's psychological functions (Silver & Hanson, 1980; 1982; Silver, Hanson, & Strong, 1984; Strong, Silver, & Hanson, 1985). Yet, an instrument for

showing teacher preference for different kinds of teaching activities using a Jungian framework could not be found.

Silver et al. (1984, pp. 14-15) advocate a holistic approach to teaching. They state that function and style offer a new way of confronting the diversity within ourselves, our learners, and our goals. The needs of the whole person may thus be met by using a variety of mastery (ST), interactive (SF), searching (NF), and understanding (NT) styles. By becoming familiar with each of the four styles, they were successful in designing a process whereby activities may be classified according to Jung's psychological functions (Appendix O). This process was used to conduct a content analysis of the program in terms of activity type (see Appendix P for a classification of the activities of the Primary Environmental Studies Program and Appendix N for the classified activities of one of the grade one units).

The same classification process (Note 16) was used to develop the TAPI (Appendix W) to test teacher preference for the activities chosen from all three of the grade levels of the program being examined in the present study. The TAPI is a 20-item questionnaire divided into five sections each containing one description of each of the four types of teaching activities (ST, SF, NF, and NT). Each teacher is asked to rank the activities in the five groups according to their first, second, third, and fourth choice. The advantage

of using the TAPI as designed is that it is non-threatening and the teachers are familiar with the activities. The disadvantage is that context may have a confounding effect on the results because some of the activities may be more appealing because of the topic. To try to control for this, the activities in each group were selected from the same unit, and specific directions were given to the teachers not to consider their perceived importance of the activity per se. Minor refinements were made to the wording of the activities to ensure that they represented the ST, SF, NF, and NT type of activities as clearly as possible. The teachers were also directed to assume that no one activity was better than another, that all the resources were available and ready, and that all the children would be capable of carrying out the activities.

In order to validate the TAPI, the researcher asked 3 individuals who had some experience with the MBTI to act as judges for the classification of each of the activities as ST, SF, NT, or NF (see Appendix X for the instructions to the judges). The level of agreement with the researcher was 80%, 88%, and 100%. In no case, did two or three judges disagree with the researcher on any one classification (Appendix Y). Having the judges indicate the reason for their choice by underlining key words or making notations in the margin proved to be very useful. In the cases in which the activities were misclassified, the notations were helpful in

making revisions to the description of the activities. The aim was to choose words which would make the activities appear to be equally valuable from an instructional point of view, clear, and appealing to the specific personality types.

It was decided not to readminister the TAPI to the teachers of the present study because of a concern for subject overload. In addition, it would not be possible to replicate the conditions for the administration of the questionnaire since the TAPI was to be given to the subjects during the LoU interview time. The second administration would have had to be by mail. Instead, the TAPI was given to a group of primary teachers taking an additional qualifications primary methods course ( $N = 48$ ) at the University of Ottawa and it was readministered in the group setting three weeks later.

A Pearson correlation was computed to measure the stability of the profile scores through test-retest reliability. Fox (1969) states that the expectations for the reliability of an instrument will differ depending on the nature of the information sought. In the area of attitudes and interests, the data are more flexible and changeable, and so the expectations must be adjusted down so that correlations in the .70's are still acceptable (p. 362). The results in the present study indicate that preference for some types of activities are more stable than others: ST

(.65), SF (.38), NF (.61), and NT (.51). Caution should thus be exercised in the interpretation of the results especially with reference to the SF and NT results.

The proposed analysis for the present study also includes descriptive statistics to identify other patterns which may be extracted from the data (see data analysis plan below). Therefore, a Pearson correlation was also used to assess the stability of preference for S activities (.68), N activities (.69), T activities (.50) and F activities (.50). Furthermore, to complement this information, a degree of concordance was determined to assess the stability of preference rank. Thus, the scores on the two administrations of the test were grouped in three categories consisting of: (a) same rank (1,2 : 1,2 or 2,1 : 2,1); (b) different rank (1,2 : 2,1 or 2,1 : 1,2); or (c) a tie (such as 1.5,1.5 : 1,2) in one or both of the types of activities. The number of subjects categorized as displaying the same, different, or tie rank for the S and N activities and for T and F activities respectively were: 62.5% ; 16.6% ; 20.8% and 72.9% ; 10.4% ; 16.6%. Thus, the preference rank was the same or at least tied for 82.5% of the subjects on the S and N activities and for 89.5% of the subjects on the T and F activities. All of the above results demonstrate the test-retest reliability of the TAPI in gathering different types of data. It is important to note that some of the results must be interpreted with caution.

Another factor which may be considered is that the conditions for the test administration of the TAPI during the focussed interview (one subject at a time in a very quiet setting during school hours) were superior to the group setting (in the evening after a day of work with some of the teachers choosing not to participate but remaining in the room). It is suggested that perhaps more reliable results may be gathered as part of an interview.

#### Data Collection Procedures

##### Myers-Briggs Type Indicator

The MBTI (Form G) was administered in order to select the sample according to preference strength. Devito (1985, p. 1031) states that Form G, the 126-item version is now the standard form rather than Form F with 166 items. It is an improvement over Form F in that nine of the items were rewritten to simplify language and avoid ambiguity. In addition, many of the unscored items were dropped completely. The indicator takes approximately 30 minutes to complete.

The principals were informed of the proposed study (Appendix Z) and the teachers were invited to participate in January, 1987 (Appendix A1) because this is a relatively stable and quiet time in the elementary school year. The

responses were optically scanned and as promised the teachers were given feedback on the results in April, 1987 (Appendix B1).

### Interview Session

The interviews were conducted during the time period from February to March, 1987. Each session ranging from 45 to 75 minutes in length included the LoU, the IC, and the TAPI. As a result of a pilot of the interview, the TAPI questionnaire was given first to serve as an ice-breaker. This was followed by the LoU interview and the specific probing questions concerning the three critical components of the IC. The set of questions for each of the three critical components were randomized to reduce order effect. The first few moments of the interview were spent in introductions and special attention was given to the subjects to help them feel comfortable. The subjects were given an opportunity to ask questions at the beginning and at the end of the interview. If the question could not be answered at the beginning, it was answered at the end of the interview. These teachers also received summary pages from the program to help them focus on the units (Appendix N overview sheets) but they were not given a copy of the IC or the LoU interview questions. They were most willing to express their viewpoints and found

the interview process to be a non-threatening one.

Since the interviews ranged from 45 to 75 minutes in length, 2 to 4 interviews were conducted in any one day. The order of the subject interviews depended on the time available and scheduling at the schools. If a subject was absent on a particular day, the interview was rescheduled so that all the teachers who had been selected were interviewed. Each tape and tape container was labelled with the subject's name and interview number to facilitate identification. The collection process took approximately 6 weeks. One month had been set aside for the rating of the tapes but it was found that after a few interviews, the ratings could be done right after the subject left the room since the process had been well internalized (see Appendix D for a copy of the rating sheet used for the interviews). In a few of the cases, the tapes were listened to again for verification purposes.

In order to reduce interviewer bias, the personality style of the subjects was not known during the interview sessions. Someone else had been asked to match the teachers' names with the MBTI results for subject selection and the information on teacher personality style was left off thereafter. In addition, the determination of the LoU and IC levels during the interview demands a great deal of concentration so that very little time can be devoted to personality style speculations. Data analysis was begun only after all of the results were collected.

Assumptions

The underlying assumptions of the present study are:

1. Teaching can be viewed as the expression of individual personalities. Understanding the person factor contributes to an understanding of the dynamics of implementation especially with reference to the possible reasons why programs are implemented in particular ways by particular people.

2. Change is a highly personal experience. The role of the teacher in the implementation process and in the program as defined by the teacher is central to program implementation.

3. If we are to understand why programs are being implemented in particular ways, then we must know how teachers exercise judgment and make decisions.

Limitations

The underlying limitations of the present study are:

1. The generalizability of the results is limited to

one primary level environmental studies program in a large school board having both rural and urban populations.

2. American norms for the MBTI were used for sample representativeness because Canadian norms are not yet available. Furthermore, information on subjects over 40 years of age account for only 13% of the MBTI data bank while the median age in the sample used in this study is approximately 35 years.

3. The NT subjects are underrepresented in the sample because NT preferences are rare among primary teachers.

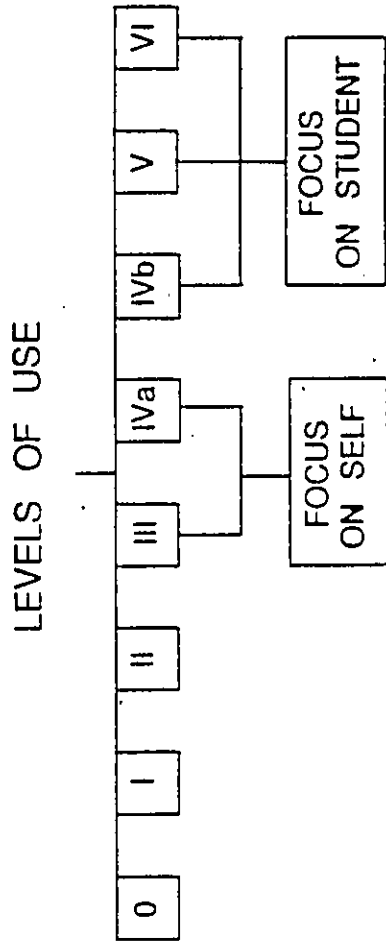
#### Data Analysis Plan

The data analysis plan of this study is organized around the hypotheses of the three research questions, the order of which is from the general to the specific. Both confirmatory and exploratory techniques are utilized. Tukey (1977, p. 3) maintains that exploratory analysis is detective in character and if one restricts oneself only to planned analysis, one may lose sight of the most interesting results. Exploratory and confirmatory approaches can and should proceed side by side (p. viii). The confirmatory analysis for the first two research questions involving implementation and personality

style (Figure 1) and type of program delivery and personality style (Figure 2) makes use of chi-square procedures to compare the frequency data obtained from the levels of use interview, the innovation configurations checklist, and the Myers-Briggs Type Indicator. Exploratory posthoc analyses are also conducted to determine more precisely areas of significance or to explore other possible findings. The exploratory analysis for the third research question involving teaching activity type preference and personality style (Figure 3) is analyzed with a MANOVA procedure to compare the profiles of activity choice generated by the Teaching Activity Preference Indicator. This analysis is exploratory because so little is known about preferences for teaching activities in relation to personality style and because very little research has been conducted regarding dominant functions (Devito, 1985, 1030). The MANOVA analysis is supplemented with a Tukey Multiple Pairwise Comparison to localize the differences, and with descriptive statistics (Figure 4) to identify other patterns which can be extracted from the data.

The level of significance chosen for the present study is .05 since it is the most commonly used level in implementation research. The presentation of the data and the analysis of the results, research question by research question, are combined in chapter 5 to facilitate a discussion of the findings.

PROGRAM IMPLEMENTATION



with  
PERSONALITY STYLE

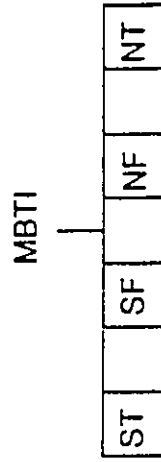
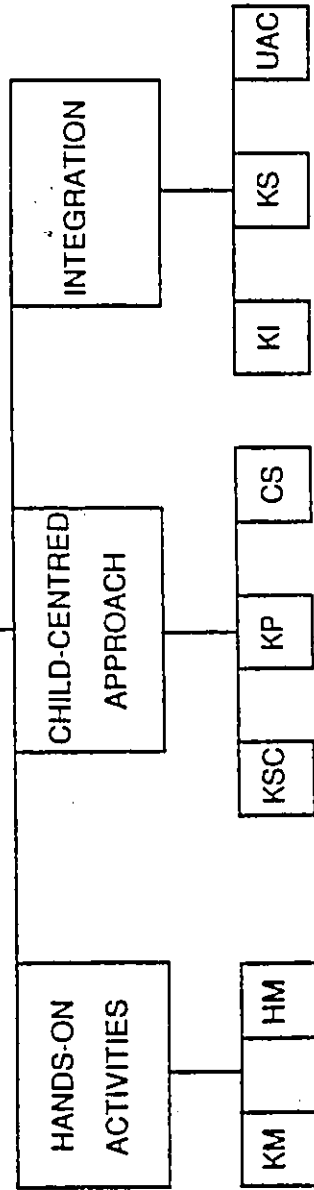


Figure 1 Diagrammatic Representation of the First Research Question

Note. ST = sensing/thinking. SF = sensing/feeling.  
 NF = intuitive/feeling. NT = intuitive thinking.

PROGRAM DELIVERY

INNOVATION CONFIGURATIONS CHECKLIST



with

PERSONALITY STYLE

MBTI

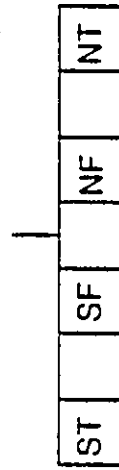
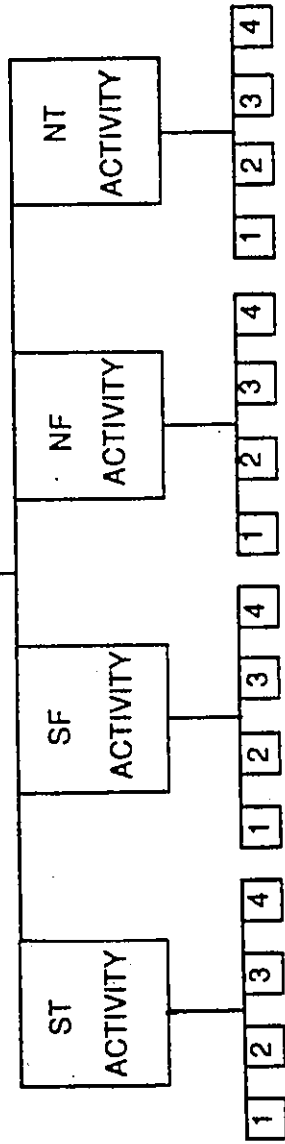


Figure 2 Diagrammatic Representation of the Second Research Question

Note. ST = sensing/thinking. SF = sensing/feeling.  
 NF = intuitive/feeling. NT = intuitive/thinking.  
 KM = kinds of materials. HM = handling of materials.  
 KSC = kinds of student choice. KP = kinds of planning.  
 CS = classroom setup. KI = kinds of integration.  
 KS = kinds of scheduling. UAC = use of activity centres.

PREFERENCES FOR TEACHING ACTIVITY TYPES  
TEACHING ACTIVITY PREFERENCE INDICATOR



with

PERSONALITY STYLE

MBTI



Figure 3 Diagrammatic Representation of the Third Research Question (MANOVA Statistics)

Note. ST = sensing/thinking. SF = sensing/feeling.  
 NF = intuitive/feeling. NT = intuitive/thinking.  
 1 = first choice. 2 = second choice. 3 = third choice.  
 4 = fourth choice.

# PREFERENCES FOR TEACHING ACTIVITY TYPES

## TEACHING ACTIVITY PREFERENCE INDICATOR

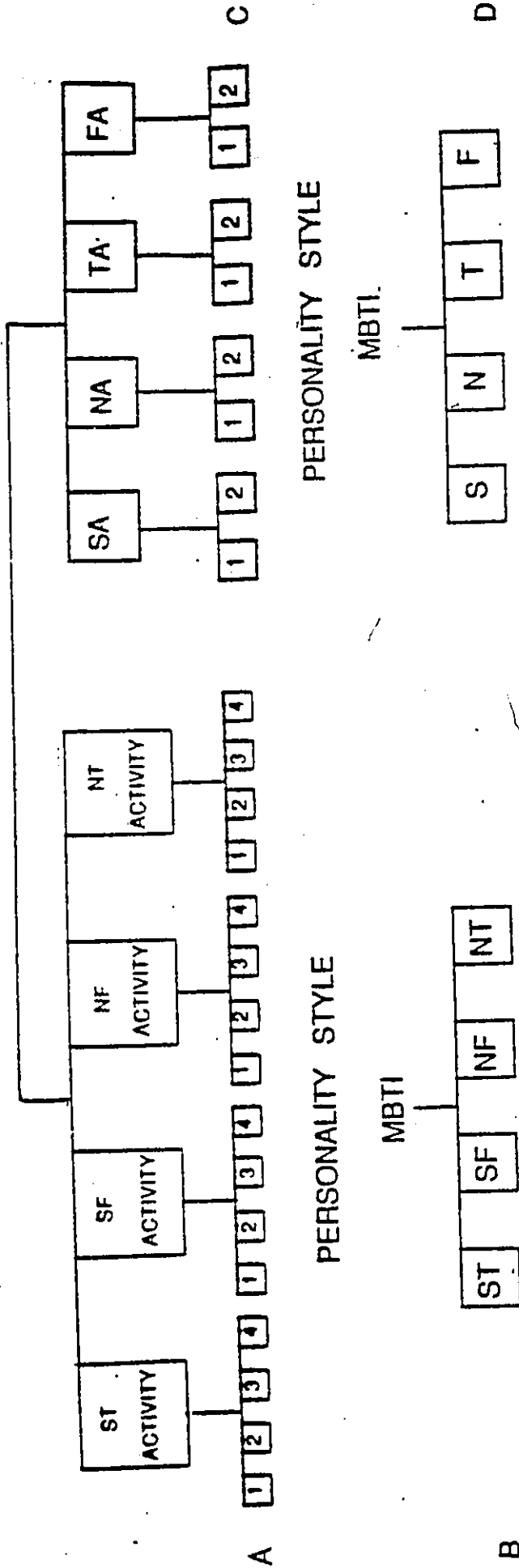


Figure 4 Diagrammatic Representation of the Fourth Research Question (Descriptive Statistics)

Note. The combinations examined are: A with B; B with C; C with D.

- ST = sensing/thinking. SF = sensing/feeling.
- NF = intuitive/feeling. NT = intuitive/thinking.
- SA = sensing activity. NA = intuitive activity.
- TA = thinking activity. FA = feeling activity.
- S = dominant sensing. N = dominant intuitive.
- T = dominant thinking. F = dominant feeling.
- 1 = first choice. 2 = second choice. 3 = third choice.
- 4 = fourth choice.

## Chapter 5

### Presentation and Discussion of the Results

Chapter 5 consists of a presentation of the results for each of the three research questions and an interpretation of these findings in light of theory and previous research. The relationship between the implementation of the Primary Environmental Studies Program and personality style as measured by the Levels of Use (LoU) and the Myers-Briggs Type Indicator (MBTI) will be discussed first. This is followed by a discussion of the relationship between the type of program delivery and personality style as measured by the Innovations Configurations Checklist (IC) and the MBTI. An examination of the relationship between the preferences for particular kinds of teaching activities and personality style as measured by the Teaching Activity Preference Indicator (TAPI) and the MBTI will conclude this chapter. The sample of primary elementary teachers is the same for all three of the research questions ( $N = 60$ ).

#### Analysis of the Relationship Between Degree of Implementation and Personality Style

The hypothesis for the first research question is that the intuitive teachers implement the Primary Environmental Studies Program to a higher degree than the other teachers.

Restated more specifically in terms of the SN dichotomous function as measured by the MBTI: N (intuitive) teachers implement the program to a higher degree than S (sensing) teachers. Hoffman and Betkouski (1981) state that researchers should go beyond single attitude (EI or JP) or single function (SN or TF) comparisons to do justice to the concept of type (p. 28). The analysis of each hypothesis thus includes first a test of the hypothesis as stated, and if there is significance, further posthoc refinements. This is followed by exploratory analyses to supplement the information one can extract from all attitudes (EI, JP) and functions (SN, TF).

The results of the LoU interviews indicate that 23 subjects (38%) are at mechanical level of use (LoU III); 16 subjects (27%) are the routine level of use (LoU IVa); 12 subjects (20%) are at the refinement level of use (LoU IVb); 5 subjects (8%) are at the integration level of use (LoU V); and 4 subjects (7%) are at the renewal level of use (LoU VI) (Appendix C). As can be seen from these results, most of the subjects (65%) are at LoU III and LoU IVa. There are no teachers at LoU 0, I, or II because all of the teachers interviewed were using the program. Considering that the subjects have been using the program for approximately two years, this finding is as expected. Rutherford et al. (1983, p. 140) declare that 60-70% of first-year users will be at a LoU III. Hall et al. (1975) state that individuals do not

7

use an innovation the first or second time as effectively as they do after four or five cycles of use and that it is frequently the case that users never reach LoU IVb (pp. 52-3). In general terms, after three cycles of use, 30-40% of an innovation's users are stable at LoU IVa (p. 56). They further maintain that "experience is essential but not sufficient to insure that a given individual will develop high-quality use of an innovation" (p. 52.). The findings of the present study may contribute to an understanding of why experience may be essential yet not sufficient to reach higher levels of implementation.

A chi-square procedure was used to test the first hypothesis based on the distribution of the levels of use obtained from the LoU interviews. To carry out the comparisons, the mechanical and routine levels of use and the refinement, integration, and renewal levels of use were collapsed to create a dichotomy between focus on self and focus on student. Collapsing frequency distributions is an accepted procedure as long as the collapsing is based on rational considerations and the categories are determined before the data is scrutinized (Fox, 1969, p. 283-284; Lewis & Burke, 1971, p. 89). This procedure is especially useful when the theoretical frequencies are too small to warrant stable results (Lewis & Burke, 1971, p. 68) as is the case in the present study. In addition to collapsing cells for the LoU, it was also decided to combine the 3 NT subjects with

the 20 NF subjects as long as this combination would not change the findings appreciably. An analysis was run including and excluding the NT subjects to determine if NTs could be collapsed with NFs with no appreciable difference in the results. It was decided to continue to combine the NTs with the NFs for the remainder of the analyses of the present study because combining the NTs with the NFs does not result in an appreciable difference.

Yates' correction for continuity was applied in the 2 x 2 contingency tables when an estimated cell frequency was less than or equal to 5 (Ferguson, 1976, p. 201; Edwards, 1971, pp. 115-118) and the Fisher Exact Test if the sample size was less than or equal to 20 (Cochran, 1971, p. 135). The chi-square statistic (7.594,  $p = .006$ ) indicates that there is a dependency between personality style (S, N) and levels of use (self, student). Out of 60 subjects, 29 sensing teachers displayed a lower degree of program implementation by focusing on self, and 13 intuitive teachers displayed a higher degree of program implementation by focusing on the student (Table 2).

Posthoc analyses (Table 2) were also conducted to explore further the concept of type. The pattern for the SN function is also manifested when combined with the TF function. The chi-square statistic (11.018,  $p = .004$ ) indicates that there is a dependency between personality style (ST, SF, NF/T) and levels of use. In order to

Table 2

Relationship Between Degree of Implementation and Personality Style (SN ; TF)

| Personality Style   | n  | Levels of Use | df | $\chi^2$ | p prob. |
|---------------------|----|---------------|----|----------|---------|
| S ; N               | 60 | self/student  | 1  | 7.594    | .006    |
| Posthoc Comparisons |    |               |    |          |         |
| ST ; SF ; NF/T      | 60 | self/student  | 2  | 11.018   | .004    |
| ST ; NF/T           | 40 | self/student  | 1  | 11.018   | .001    |
| ST ; SF             | 37 | self/student  | 1  | 3.040    | .081*   |
| SF ; NF/T           | 43 | self/student  | 1  | 1.992    | .158    |

Note. self = LoU III, IVa student = LoU IVb, V, VI.

NF/T = NT combined with NF.

\*After Yates' Correction.

localize this significance, pairwise comparisons were conducted. The next chi-square statistic (11.018,  $p = .001$ ) indicates that there is a dependency between the ST and the NF/T personality styles and levels of use. Out of 40 subjects, 16 sensing/thinking teachers displayed a lower degree of program implementation by focusing on the self, and 13 intuitive/feeling/thinking teachers displayed a higher degree of program implementation by focusing on the student. The chi-square statistics (3.040,  $p = .081$  ; 1.992,  $p = .158$ ) indicate that there is no dependency between the ST and SF and the SF and NF/T personality styles and levels of use. In other words, if the subjects have a sensing or feeling function in common, the chi-square statistic does not indicate a dependency between the two variables.

In summary, the above results lend support to the Jungian theory that intuitive individuals have a greater facility in creative planning and the exploration of possibilities. This skill would be needed to implement the most difficult aspect of the Primary Environmental Studies Program which is the integration of content areas in order to teach thematically. During the LoU interviews, the subjects indicating a mechanical use of the program would often mention integration concerns. In other words, integration seemed to be the critical component which either facilitated or hindered higher degrees of program implementation.

The above findings were extended by exploring the

relationship of the EI and JP attitudes and the TF function with levels of use (Table 3). Specific analyses were conducted in the cases where the more general analyses indicated significance. Beginning with the single attitude and function comparisons, the chi-square statistics (5.934,  $p = .015$  ; 5.275,  $p = .022$ ) indicate that there is a dependency between the EI and TF personality styles and levels of use. In the two comparisons each involving 60 subjects, 24 extraverts and 17 thinking subjects displayed a lower degree of implementation by focusing on self, and 15 introverts and 18 feeling subjects displayed a higher degree of implementation by focusing on the student. Yet, it is important to note that of the 20 thinking subjects, 17 are STs since NT teachers are very rare at the primary level. Further research using more NT subjects is needed to determine if there is still a dependency between the TF function and levels of use.

In support of the above findings, DeNovellis and Lawrence (1983, p. 42) found that feeling teachers attend pupils more closely and consider pupils to be central in the activities. Thompson (1984) as reported in Myers and McCaulley (1985, p. 135) found that SF teachers are more inclined to take students' abilities into consideration and NF teachers tend to adapt plans to student needs. In addition, in looking at the descriptions of introverted feeling and introverted sensing types, one can identify

Table 3

Relationship Between Degree of Implementation and Personality Style (EI ; SN ; TF ; JP)

| Single Attitude/Function Posthoc Comparisons   |    |               |    |          |                   |
|--|----|---------------|----|----------|-------------------|
| Personality Style                              | n  | Levels of Use | df | $\chi^2$ | p prob.           |
| E ; I  | 60 | self/student  | 1  | 5.934    | .015              |
| T ; F  | 60 | self/student  | 1  | 5.275    | .022              |
| J ; P  | 60 | self/student  | 1  | 0.330    | .566              |
| Multiple Attitude/Function Posthoc Comparisons |    |               |    |          |                   |
| EST;IST;ESF;ISF;                               |    |               |    |          |                   |
| ENF/T;INF/T                                    | 60 | self/student  | 5  | 16.788   | .005*             |
| ENF/T INF/T ISF;                               |    |               |    |          |                   |
| EST IST ESF                                    | 60 | self/student  | 1  | 13.733   | .001              |
| ENF/T; INF/T;                                  |    |               |    |          |                   |
| ESF; ISF                                       | 43 | self/student  | 3  | 6.930    | .074              |
| ET; EF; IT; IF                                 | 60 | self/student  | 3  | 10.558   | .014 <sup>b</sup> |
| ET ; EF  | 30 | self/student  | 1  | 2.593    | .107              |
| IT ; IF  | 30 | self/student  | 1  | 0.635    | .426              |

Note. self = LoU III, IVa student = LoU IVb, V, VI.

NF/T = NT combined with NF. <sup>a</sup>pE.F. < 5.

specific strengths of introverted subjects such as making close observations, paying close attention for long periods of time, and giving systematic attention (Myers, 1985, pp. 12; 14). These strengths along with characteristics associated with feeling subjects, contribute to higher levels of implementation. The specific comparisons involving the TF and SN functions were discussed previously (Table 2).

In examining the multiple attitude and function comparisons (Table 3), three chi-square statistics (16.788,  $p = .005$  ; 13.733,  $p = .001$  ; 10.588,  $p = .014$ ) indicate that there is a dependency between EI, SN, and TF personality style combinations and levels of use. Higher degrees of implementation are associated with introverted subjects, intuitive subjects, and feeling subjects. The findings of two of these three analyses should be accepted with caution because estimated frequencies less than 5 were evident in 7 of the 12 cells (58%), and in 2 of the 8 cells (25%) respectively (Table 3<sup>a-b</sup>). On the other hand, Cochran (1971) suggests that the writers who maintain that the estimated frequencies should not be less than 5, may be too conservative because not enough research has been done to make the situation clear (pp. 133-134). Thus, these findings are not conclusive but do indicate an area for further research.

The influence of program experience on implementation was also investigated to determine if there is a significant difference in program implementation between the 15

first-year users and the 45 second-year users. The first-year users were included to complete the sample in terms of sample size, preference strength, creating balanced groups, and because the program had been out only for two years. In the present study, the number of years of program experience is not significant for implementation as indicated by the proportion of first-year and second-year subjects who were spread evenly across the focus on self and focus on student levels of use (Table 4).

The influence of the number of years of teaching experience on implementation was also investigated because of differing views in the literature. Kremer and Ben-Peretz (1980) describe two schools of thought (a) fatigue resulting from many years of teaching may interfere with the energy needed for new curricula implementation; and (b) inexperienced teachers may be absorbed by the need to master teaching skills and classroom management (p. 74). Rutherford et al. (1983, p. 144) state that it is often said that all teachers are resistant to change and very young teachers are not yet able to make meaningful changes. Yet there is little evidence to support this. Kremer and Ben-Peretz (1980), using a small sample size ( $N = 15$ ), report that due to the fact that the more senior teachers may be experiencing fatigue, or that they may have deeply-rooted habits, they may not be as successful in implementing new changes (p. 78). They also state that for practical purposes "one implication

Table 4

Relationship Between Degree of Implementation and Experience

|  | n  | Levels of Use | df | $\chi^2$ | p prob. |
|--|----|---------------|----|----------|---------|
| Program Experience<br>(1 ; 2 years)                  | 60 | self/student  | 1  | 1.978    | .160    |
| Teaching Experience<br>(1-10 ; 11-20 ; 21+<br>years) | 60 | self/student  | 2  | 0.136    | .934    |

Note. self = LoU III, IVa student = LoU IVb, V, VI.

may be that new curricula requiring a great deal of initiative will be better put into practice by teachers that have relatively limited seniority" (p. 80).

The findings of the present study indicate that the number of years of teaching experience is not significant in implementation because teaching experience is not associated with levels of use (Table 4). This finding supports the view that change is a highly personal experience. All too often more attention is paid to "the trappings and technology of the innovation" while the "perceptions and feelings of the people experiencing the change process" are ignored (Rutherford et al., 1983, p. 134). In the Concerns-Based Adoption Model (CBAM) which includes the LoU and the IC, the personal dimension is of more critical importance to success or failure than the amount of technical support because the underlying philosophy of the approach is that change is brought about by individuals with personal perceptions, concerns, and motivations (p. 134). The findings in the present study support the importance of the person factor in implementation.

#### Analysis of the Relationship Between Type of Program Delivery and Personality Style

The hypothesis for the second research question is that

the degree of fidelity to the program as intended varies with personality style. The degree of fidelity to the program is predicted to be higher when there is a match between personality style and program component type. More specifically, there are three sub-hypotheses, one for each of the critical components of the Primary Environmental Studies Program (a) hands-on activity (sensing), (b) child-centred approach (feeling), and (c) integration (intuition). Confirmatory and exploratory analyses were conducted for each of the dimensions in each of the three critical components (Figure 2).

#### Hands-on Activity Component

The first sub-hypothesis is that sensing teachers display a higher degree of fidelity to the hands-on activity component of the program. The hands-on critical component has two dimensions (a) kinds of materials and (b) student/teacher handling of the material. To carry out the comparisons on these dimensions, the program variation categories were grouped as follows: for kinds of materials, the second, third, and fourth variations were collapsed (wide/limited use); and for student/teacher handling of materials, the second, third, and fourth variations were collapsed (student/teacher major user) (see Appendix U for a description of the Innovation Configurations Checklist).

The kinds of materials and handling of materials dimensions were not found to be associated with personality style (Table 5).

To complement the above findings, the frequency distributions of the program variation categories were analyzed (Appendix C1). The low level of discrimination in the kinds of materials dimension may be due to the fact that how much material may be more important than how many different kinds of materials are used to teach the program. Similarly, the low level of discrimination in the handling of materials dimension may be due to how much material is being handled as well as to who is handling the material. Sensing individuals prefer to take in information by way of the five senses. Their orientation is towards immediate experience, realism, acute powers of observation, and practicality (Myers & McCaulley, 1985, p. 12). Theoretically, it could be argued that this orientation is reflected in the hands-on type of teaching strategies.

Further research is needed to gather information on how much of the different kinds of materials a teacher chooses to utilize in the classroom and how much material is actually being handled by the students and the teacher, in addition to the number of different kinds of materials chosen and who is doing the handling. The classroom observation mode may be more conducive for gathering this type of data. In an interview setting, it could be difficult to control for

Table 5

Relationship Between Kinds of Materials, Student/Teacher Handling of Materials, and Personality Style (SN)

|                       |                | n  | $\chi^2$ | p prob. |
|-----------------------|----------------|----|----------|---------|
| Kinds of Materials    | Variety W/L    | 60 | 1.641    | .200    |
| Handling of Materials | Major User S/T | 60 | 2.208    | .137    |

Note. df = 1. W = wide L = limited. S = student  
T = teacher.

different standards being used by the subjects to indicate the amount and kind of material use. It may also be useful to find out if sensing and intuiting teachers use materials in a different manner or for different reasons. In other words, are the materials used mainly for such activities as observing, touching, and measuring as designated by the programs or are the materials used in innovative ways to encourage the students to develop their creativity by designing their own activities? Teachers often change program activities to suit their own preferred ways of teaching or to meet specific student needs as they perceive them.

In addition to the confirmatory analyses, exploratory EI, TF, and JP analyses were also conducted on both dimensions. As one might expect, these personality style attitudes and functions are not significantly associated with the kinds of materials dimension and the handling of materials dimension.

#### Child-Centred Approach Component

The second sub-hypothesis is that feeling teachers display a higher degree of fidelity to the child-centred component of the program. The child-centred component has three dimensions (a) kinds of student choice, (b) type of

planning, and (c) classroom setup. To carry out the comparisons on these dimensions, the program variation categories were grouped as follows: the first/second variations and the third/fourth variations of the kinds of student choice dimension (wide/limited variety); the first/second variations and the third/fourth variations of the type of planning dimension (individual/group focus); and the first variation and the second/third variations of the classroom setup dimension (structured/unstructured). The kinds of student choice, type of planning, or classroom setup dimensions were not found to be associated with personality style (Table 6).

To complement the above findings, the frequency distributions of the program variation categories were analysed (Appendix C1). The low level of discrimination in the kinds of student choice dimension may be due to the fact that the amount of student choice may be just as important as the variety of choice. Once again, the observation mode may be more appropriate for gathering the data. In addition, at the primary level, the age of the students and/or the demands of the curriculum may interfere with the teachers' preferred mode of teaching. It may be perceived that the students are not yet old enough to make independent decisions. Allowing students variety of choice of activities and greater choice, may also involve both more teacher planning time and more time to complete the teaching of the units. Teachers often

Table 6

Relationship Between Kinds of Student Choice, Type of Planning, Classroom Setup, and Personality Style (TF)

|                         |             | n  | $\chi^2$ | p prob. |
|-------------------------|-------------|----|----------|---------|
| Kinds of Student Choice | Variety W/L | 60 | 0.000    | 1.000   |
| Type of Planning        | Focus I/G   | 60 | 0.834    | .361    |
| Classroom Setup         | Type S/US   | 60 | 0.036    | .850    |

Note. df = 1. W = wide L = limited. I = individual  
 G = group. S = structured US = unstructured. NF/T = NT  
 combined with NF.

express a concern with not having enough time to teach the programs. Time-restraints may interfere with the teachers' preferred mode of teaching. Further research is necessary.

The low level of discrimination (Appendix C1) in the classroom setup dimension may be due to the fact that grouping students at the primary level is known as the preferred classroom structure. When the subjects were interviewed, their preference for structure was emphasized rather than present classroom structure to minimize any possible constraints (i.e. budget, administrative directives). On the other hand, being given the opportunity to state preferences, perhaps a greater percentage of subjects gave grouping as a preference because it is expected especially in the primary grades. Further research, more clearly documenting the type of classroom structures used and preferred over time, is needed. It may also be worthwhile to find out if the reasons for grouping vary with different personality styles.

The frequency distributions of the program variation categories of the planning dimension (Appendix C1) are spread more evenly and yet there is no significant association between this dimension and personality style. The top program variation category of the planning dimension (Appendix U) is defined as teachers and students planning different kinds and numbers of activities together based on student needs. In looking at this definition and what it

implies more closely, it may be argued that there are both feeling and intuitive components. Caring for the individual child, attention to student self-concept, and working together are SF characteristics. The ability to plan different kinds and numbers of activities are NF and/or NT characteristics. According to theory, intuitives like solving problems and are patient with complicated situations (Myers & McCaulley, 1985, p. 80). This characteristic could be expressed in planning specifically to meet individual student needs. Exploratory SN analyses were thus conducted to find out if the data in the present study contained any significant patterns (Table 7). There is a significant association (4.258,  $p = .039$ ) between type of planning and personality style whereby out of 60 subjects, 15 intuitive teachers emphasized individual planning and 23 sensing teachers emphasized group planning. Further analyses were conducted to explore the influence of the TF function in combination with the SN function. There is a significant association (5.013,  $p = .025$ ) between type of planning and personality style (ST ; NF/T). Out of 40 subjects, 15 intuitive feeling/thinking teachers emphasized individual planning and 12 sensing/thinking teachers emphasized group planning. As observed in Table 7, no additional significant associations were found.

Support for these findings are found in Thompson's study (1984) as reported in Myers & McCaulley, 1985, p. 135): NFs

Table 7

An Exploratory Analysis of the Relationship Between Type of  
Planning and Personality Style (SN ; TF)

| Personality Style | n  | Focus | df | $\chi^2$ | p prob. |
|-------------------|----|-------|----|----------|---------|
| S ; N             | 60 | I/G   | 1  | 4.258    | .039    |
| ST ; NF/T         | 40 | I/G   | 1  | 5.013    | .025    |
| ST ; SF ; NF/T    | 60 | I/G   | 2  | 5.152    | .076    |
| SF ; NF/T         | 43 | I/G   | 1  | 1.773    | .183    |
| ST ; SF           | 37 | I/G   | 1  | 0.949    | .330    |

Note. I = focus on individual planning G = focus on group planning . NF/T = NT combined with NF.

and NTs get their ideas for teaching from knowledge of student development and needs while SFs and STs rely more on curriculum guides and texts. In terms of planning, STs make complete and detailed plans with specific objectives in advance; SFs establish objectives and detailed plans using the yearly school calendar and take students' abilities into consideration; NFs structure their plans around general goals, themes, and student needs, and adapt the plans to student needs week to week; and NTs make plans according to an overall yearly structure organized by concepts or themes, and determine details by student levels.

The classification of components and/or dimensions according to the Jungian functions is not always clear. It may be argued that the difference between taking students' abilities into consideration (SF) and planning around student needs (NF) or determining details by student levels (NT) is not a large one. Both the feeling and intuitive functions are important in meeting individual needs. Thompson's study (1984) and the present study indicate that the intuitive function has a strong influence in the planning dimension. In summary, one may conclude that if the planning dimension is reclassified as an integration component (intuitive), then significant associations are found. To complete the analysis of the planning dimension, exploratory EI and JP analyses were conducted. There are no other significant results.

Similarly, exploratory EI, SN, and JP analyses were

conducted on the kinds of student choice and the handling of materials dimensions. As one might expect, no additional significant associations were found. Due to the large number of analyses and their secondary importance, these results are not reported in table form.

### Integration Component

The third sub-hypothesis is that intuitive teachers display a higher degree of fidelity to the integration component of the program. The integration component has three dimensions (a) kinds of integration, (b) kinds of scheduling, and (c) use of activity centres. To carry out the comparisons on these dimensions, the program variation categories (Appendix U) were grouped as follows: the first/second variations and the third/fourth variations of the kinds of integration dimension (more/less integration); the first/second variations and the third variation of the kinds of scheduling dimension (fluid/structured scheduling); and the first variation and second/third variations of the use of activity centres dimension (extensive/little use). The frequencies of the program variations are spread across each of the three dimensions (Appendix C1).

As can be seen from Table 8, there is a significant association (8.511,  $p = .004$ ) between kinds of integration

Table 8

Relationship Between Kinds of Integration and Personality  
Style (SN ; TF)

| Personality Style | n  | Integration | df | $\chi^2$ | p prob. |
|-------------------|----|-------------|----|----------|---------|
| S ; N             | 60 | M/L         | 1  | 8.511    | .004    |

Posthoc Comparisons

|                |    |     |   |       |      |
|----------------|----|-----|---|-------|------|
| ST ; SF ; NF/T | 60 | M/L | 2 | 8.669 | .013 |
| ST ; NF/T      | 40 | M/L | 1 | 6.812 | .009 |
| SF ; NF/T      | 43 | M/L | 1 | 5.310 | .021 |
| ST ; SF        | 37 | M/L | 1 | 0.005 | .944 |

Note. M = more L = less. NF/T = NT combined with NF.

and personality style whereby out of 60 subjects, 15 intuitive teachers utilized more integration and 27 sensing teachers utilized less integration. Further analyses were conducted to explore the influence of the TF function in combination with the SN function. Three additional significant associations were found between kinds of integration and personality style. The first chi-square statistic (8.669,  $p = .013$ ) indicates that there is a dependency between kinds of integration and personality style (ST ; SF ; NF/T) whereby out of 60 subjects, 15 intuitive feeling/thinking subjects utilized more integration and 13 sensing/thinking subjects and 14 sensing/feeling subjects utilized less integration. Similarly, the second and third chi-square statistics (6.812,  $p = .009$  ; 5.310,  $p = .021$ ) indicate that there is a dependency between kinds of integration and personality style (ST ; NF/T and SF ; NF/T).

As can be seen from Table 9, there is also a significant association (9.094,  $p = .003$ ) between kinds of scheduling and personality style whereby out of 60 subjects, 16 intuitive teachers utilized fluid scheduling and 26 sensing teachers utilized structured scheduling. Further analyses were conducted to explore the influence of the TF function in combination with the SN function. Three additional significant associations were found between kinds of scheduling and personality style. The first chi-square statistic (9.952,  $p = .008$ ) indicates that there is a

Table 9

Relationship Between Kinds of Scheduling and Personality

Style (SN ; TF)

| Personality Style | n  | Scheduling | df | $\chi^2$ | p prob. |
|-------------------|----|------------|----|----------|---------|
| S ; N             | 60 | F/S        | 1  | 9.094    | .003    |

Posthoc Comparisons

|                |    |     |   |       |      |
|----------------|----|-----|---|-------|------|
| ST ; SF ; NF/T | 60 | F/S | 2 | 9.582 | .008 |
| ST ; NF/T      | 40 | F/S | 1 | 8.286 | .004 |
| SF ; NF/T      | 43 | F/S | 1 | 5.137 | .023 |
| ST ; SF        | 37 | F/S | 1 | 0.579 | .447 |

Note. F = fluid S = structured. NF/T = NT combined with NF.

dependency between kinds of scheduling and personality style (ST ; SF ; NF/T) whereby out of 60 subjects, 16 intuitive feeling/thinking subjects utilized fluid scheduling and 13 sensing/thinking subjects and 13 sensing/feeling subjects utilized structured scheduling. Similarly, the second and third chi-square statistics (8.286,  $p = .004$  ; 5.137,  $p = .023$ ) indicate that there is a dependency between kinds of kinds of scheduling and personality style (ST ; NF/T and SF ; NF/T).

The same pattern is repeated once more in Table 10. There is a significant association (13.337,  $p = .001$ ) between use of activity centres and personality style whereby out of 60 subjects, 18 intuitive teachers utilized more activity centres and 26 sensing teachers utilized less activity centres. Further analyses were conducted once again to explore the influence of the TF function in combination with the SN function. Three additional significant associations were found between use of activity centres and personality style. The first chi-square statistic (13.861,  $p = .001$ ) indicates that there is a dependency between use of activity centres and personality style (ST ; SF ; NF/T) whereby out of 60 subjects, 18 intuitive feeling/thinking subjects utilized more activity centres and 13 sensing/thinking subjects and 13 sensing/feeling subjects utilized less activity centres. Similarly, the second and third chi-square statistics (11.831,  $p = .001$  ; 8.226,  $p = .004$ ) indicate that there is

Table 10

Relationship Between Use of Activity Centres and Personality Style (SN ; TF)

| Personality Style | n  | Centre Usage | df | $\chi^2$ | p prob. |
|-------------------|----|--------------|----|----------|---------|
| S ; N             | 60 | E/L          | 1  | 13.377   | .001    |

Posthoc Comparisons

|                |    |     |   |        |      |
|----------------|----|-----|---|--------|------|
| ST ; SF ; NF/T | 60 | E/L | 2 | 13.861 | .001 |
| ST ; NF/T      | 40 | E/L | 1 | 11.831 | .001 |
| SF ; NF/T      | 43 | E/L | 1 | 8.226  | .004 |
| ST ; SF        | 37 | E/L | 1 | 0.579  | .447 |

Note. E = extensive L = little. NF/T = NT combined with NF.

a dependency between use of activity centres and personality style (ST ; NF/T and SF ; NF/T).

From all of the above findings, it can be observed that the SN function is significantly associated with the integration component. It is interesting to note that the ST ; SF comparison (both S) is not significantly associated with any of the three dimensions. This finding gives further support to the strength of the SN dichotomy which has been described as "the preference that has the most conspicuous consequences in education" (Myers, 1983, p. 94). To complete the analysis of the integration component, exploratory EI, TF, and JP analyses were conducted. There are no other significant associations. Due to the large number of analyses and their secondary importance, these results are not reported in table form.

#### Analysis of the Relationship Between Preference for Teaching Activity Types and Personality Style

The hypothesis for the third research question is that the preference for particular kinds of teaching activities varies with personality style. Preferences for teaching activities may be considered to be the frontline to implementation because the most frequent decisions made by teachers concern activities and content (Oberg, 1980,

pp. 56-7). The preference for particular kinds of teaching activities as measured by the Teaching Activity Preference indicator (TAPI) is predicted to be higher when there is a match between teaching activity type and personality style. This hypothesis is exploratory because very little research has been conducted regarding dominant functions (Devito, 1985, 1030) and because little is known about preferences for teaching activities in relation to personality style.

The TAPI (Appendix W) is a 20-item questionnaire divided into five sections each containing one description of each of the four types of teaching activities (ST, SF, NF, and NT). Each subject is asked to rank the activities in the five groups according to their first, second, third, and fourth choice. A mathematical function was designed to indicate the subject's strength of preference for each of the four types of activities resulting in four profiles of choice. This function is a weighted sum of the frequency of responses weighted by their respective ranks. An individual may have an ST profile such as "2 1 2 0" which means that ST activities were given rank one twice, rank two once, rank three twice, and rank four not chosen. The ST preference function of this subject may be numerically expressed by:  $2 * 1 + 1 * 2 + 2 * 3 + 0 * 4 = 10$ . Using this formula, the range of preference is from 5 (five times the first rank) to 20 (five times the fourth rank) whereby the stronger preference for a particular type of activity is indicated by

a lower number. The resulting score for each type of activity gives rise to a vector of four entries per subject. Multivariate analysis was used to analyze these four dependent variables.

Globally, at the .05 level, there are significant differences between personality styles in the patterns of teaching activity choices (Table 11). Univariate  $F$  tests were then run on each of the dependent variables resulting in a significance difference between the personality styles (ST, SF, NF/T) on the ST activities ( $F = 5.806$ ,  $p = .005$ ) and the NF activities ( $F = 7.207$ ,  $p = .002$ ). There is no significant difference between the personality styles (ST, SF, NF/T) on the SF and NT activities.

Since there are more than two groups of personality styles (ST, SF, NF/T), and significant differences were observed on the ST and NF types of activities, pairwise comparisons were then conducted to localize the significant differences. These comparisons were made using the Tukey-Kramer procedure, a modification of the Tukey multiple comparison technique, because it is applicable to nonequal-sized groups. A harmonic mean of 19.698 was used in the analysis. The sample size range is small (17 to 23) and the use of the harmonic mean is justified because it creates a minimal distortion in the comparisons (Kirk, 1982, pp. 119-120).

Using this procedure, there is also a significant

Table 11

Analysis of Variance for Teaching Activity Choice as a  
Function of Personality Style (ST ; SF ; NF/T)

| Multivariate test (MANOVA) |         |            |                 |       |                 |
|----------------------------|---------|------------|-----------------|-------|-----------------|
| Pillai's                   | = 0.286 |            | ( $p = 0.026$ ) |       | $df = (8, 110)$ |
| Hotelling's                | = 0.388 |            | ( $p = 0.013$ ) |       | $df = (8, 106)$ |
| Univariate F tests         |         |            |                 |       |                 |
| Variable <sup>a</sup>      | df      | $MS_{hyp}$ | $MS_{error}$    | F     | p prob.         |
| STA                        | (2, 57) | 50.462     | 8.691           | 5.806 | .005            |
| SFA                        | (2, 57) | 5.183      | 5.420           | 0.956 | .390            |
| NFA                        | (2, 57) | 52.267     | 7.253           | 7.207 | .002            |
| NTA                        | (2, 57) | 3.844      | 11.246          | 0.342 | .712            |

Note. N = 60.

<sup>a</sup> = preference for activity types.

STA = sensing/thinking activity. SFA = sensing/feeling activity. NFA = intuitive/feeling activity. NTA = intuitive/thinking activity.

difference between the NF/T personality style and the ST and SF personality styles on the ST activities at the .05 level (Table 12). The mean of the preference function for both the ST and SF subjects is lower than the mean of the preference function for the NF/T subjects on the ST activities. Thus, one may conclude that ST and SF subjects display a significantly higher preference for ST activities than NF/T subjects. There is no significant difference between the ST and SF personality styles for ST activities. Applying the same analysis, one observes that NF/T subjects prefer NF activities to a significantly higher degree than ST and SF subjects. Once again, no such difference is observed between ST and SF subjects. All of the above findings lend support to the strength of the SN personality style dichotomy. Furthermore, the means of the preference functions for the NT activities were the highest indicating that these activities were the least preferred by all of the subjects.

In addition to the MANOVA analysis (measuring global significance), the univariate Tukey posthoc analyses, and the Tukey-Kramer procedures, (measuring preferences for ST and NF activities), descriptive statistics were also employed to identify three internal patterns within the profiles of teaching activity choice. For these three descriptive analyses, it was decided not to combine the NT subjects with the NF subjects so that the patterns of the match between personality style and activity choice could be represented

Table 12

Tukey Multiple Pairwise Comparisons of Personality Styles  
(ST ; SF ; NF/T) for ST and NF Activities

| ST Activities          |          |                         |                             |
|------------------------|----------|-------------------------|-----------------------------|
| Comparison             | Estimate | Critical Value<br>(HSD) | Sig. <sup>a</sup><br>(0.05) |
| ST - SF                | 0.024    | 2.261                   | NS                          |
| ST - NF/T <sup>b</sup> | -2.655   | 2.261                   | S                           |
| SF - NF/T              | -2.678   | 2.261                   | S                           |
| NF Activities          |          |                         |                             |
| ST - SF                | -0.206   | 2.065                   | NS                          |
| ST - NF/T              | 2.598    | 2.065                   | S                           |
| SF - NF/T              | 2.804    | 2.065                   | S                           |

Note. Harmonic mean = 19.698. df = 57.

<sup>a</sup>NS = not significant S = significant.

<sup>b</sup>NF/T = NT combined with NF.

more clearly. Yet, it is important to note that findings related to NT subjects should be accepted with caution because there are only 3 NT subjects in the sample.

The first descriptive pattern involves an analysis of the match between preferred teaching activity types and personality style (ST, SF, NF, NT). A frequency count was made of the number of subjects choosing particular types of activities as their first preference (see Appendix D1 for the raw data). As mentioned previously, the strongest preference for teaching activity type is indicated by the lowest value of the preference function. A purely random preference would yield 25% of each of the ST, SF, NF, and ST subjects preferring each of the four types of activities. The findings indicate that 52.9% of the ST subjects prefer ST activities and 70.0% of the NF subjects prefer NF activities (Figure 5).

The SF subjects display a more even preference over the four types of activities. Instead of the preferred type of activity being an SF activity, it is an ST activity (40%) indicating that sensing activities are more important for SF subjects than intuitive activities. The finding that the SF activities are not the preferred type of activity for SF subjects may be due to the fact that the SF activities themselves are not as appealing as the other types of activities or that SF subjects do not display as consistent a preference as other personality styles. Yet, Conwell's

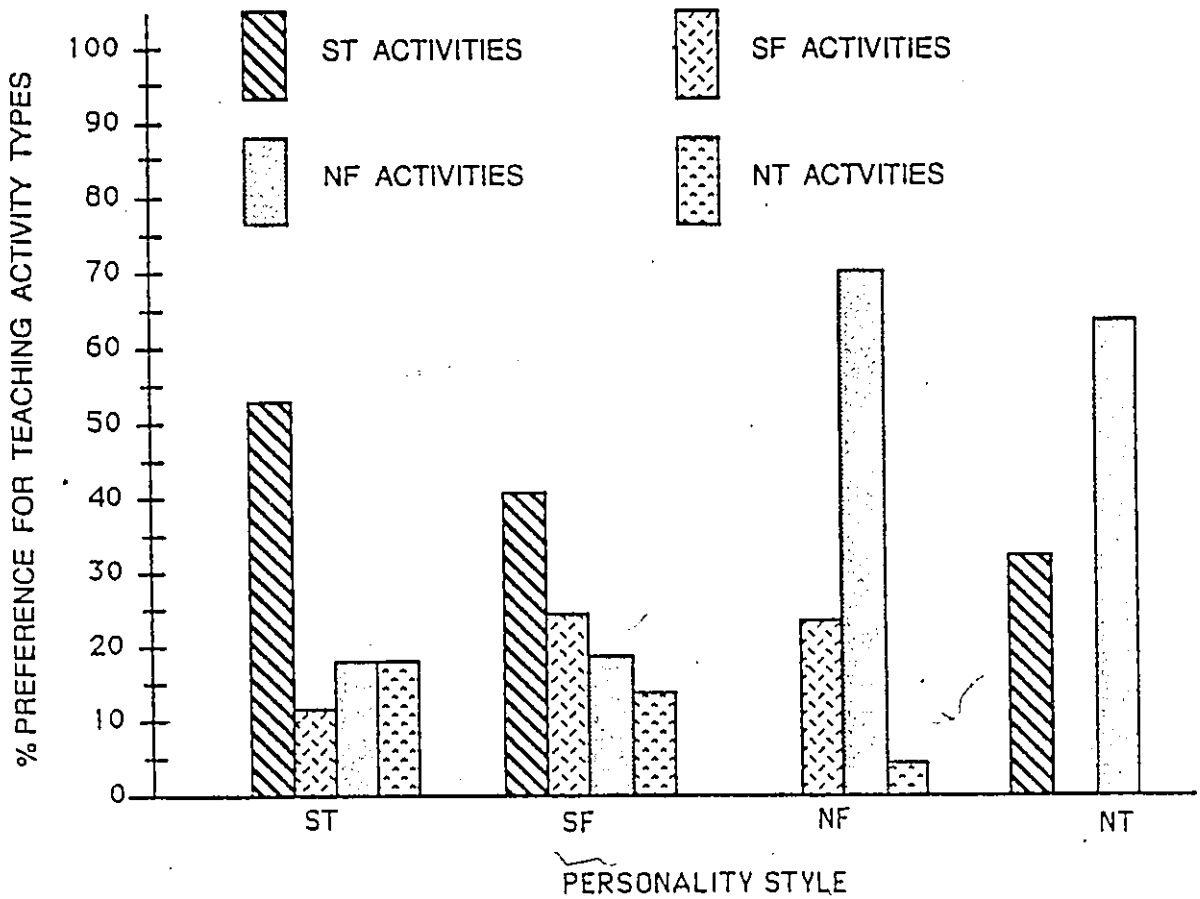


Figure 5 Match Between Personality Style and Preferred Teaching Activity Types

Note.  $n = 17$  (ST).  $n = 20$  (SF).  $n = 20$  (NF).  $n = 3$  (NT).  
 ST = sensing/thinking. SF = sensing/feeling.  
 NF = intuitive/feeling. NT = intuitive/thinking.

(1983, p. 2726A) research ( $N = 96$ ) shows that the activities that were rated as being well matched to the SF subjects received significantly more positive ratings by the SF subjects than by non-SF subjects. Similarly, mismatched activities received significantly less positive ratings. In Conwell's (1983) study, the ST, NF, and NT subjects were combined as one group. In the present study, the four personality styles are treated as four groups. More research is needed in this area to determine whether preference consistency is a function of personality style. It would also be useful to examine not only the preference for particular kinds of activities but also the actual use of the activities in the classroom.

The NT results show that, overall, these activities are the least preferred by the primary teachers. This may be due to the perception that NT activities are more suited for older students. Some of the subjects may have had difficulty divorcing their perceptions concerning student ability level from their preference for NT activities. The subjects were directed to assume that the students were capable of carrying out the activities but in indicating their preference for the activities, some of the teachers may have been influenced by their experience with students. In addition, there are very few NT teachers at the primary level. This personality style is much more common at the high school and university level (Myers & McCaulley, 1985, pp. 133-134).

The second descriptive pattern involves an analysis of the match between preference for dichotomous teaching activity types (SN ; TF) and personality style. A frequency count was made of the number of subjects showing a preference for either S activities (ST/SF) or N activities (NF/NT), and for either T activities (ST/NT) or F activities (SF/NF) as indicated by the lower value of the preference function of each of the four comparisons (see Appendix E1 for the raw data). It is important to note that these categories are not all mutually exclusive. For example, the preference for SF activities are analysed as part of the S activity group (ST/SF) and the F activity group (SF/NF). The findings indicate that there is a higher proportion of preference for dichotomous teaching activities matched to personality style on both the SN and TF dichotomies (Figure 6). Thus, the hypothesis that there is a association between the style of the person and the type of activity is supported.

A purely random preference would yield 50% of the subjects preferring either sensing or intuitive types of activities and 50% of the subjects preferring either thinking or feeling types of activities. In the present study, 76.5% of the ST subjects and 75.0% of the SF subjects display a stronger preference for sensing activities; 55.0% of the NF subjects and 66.7% of the NT subjects display a stronger preference for intuitive activities; 65.0% of the SF subjects and 95.0% of the NF subjects display a stronger preference

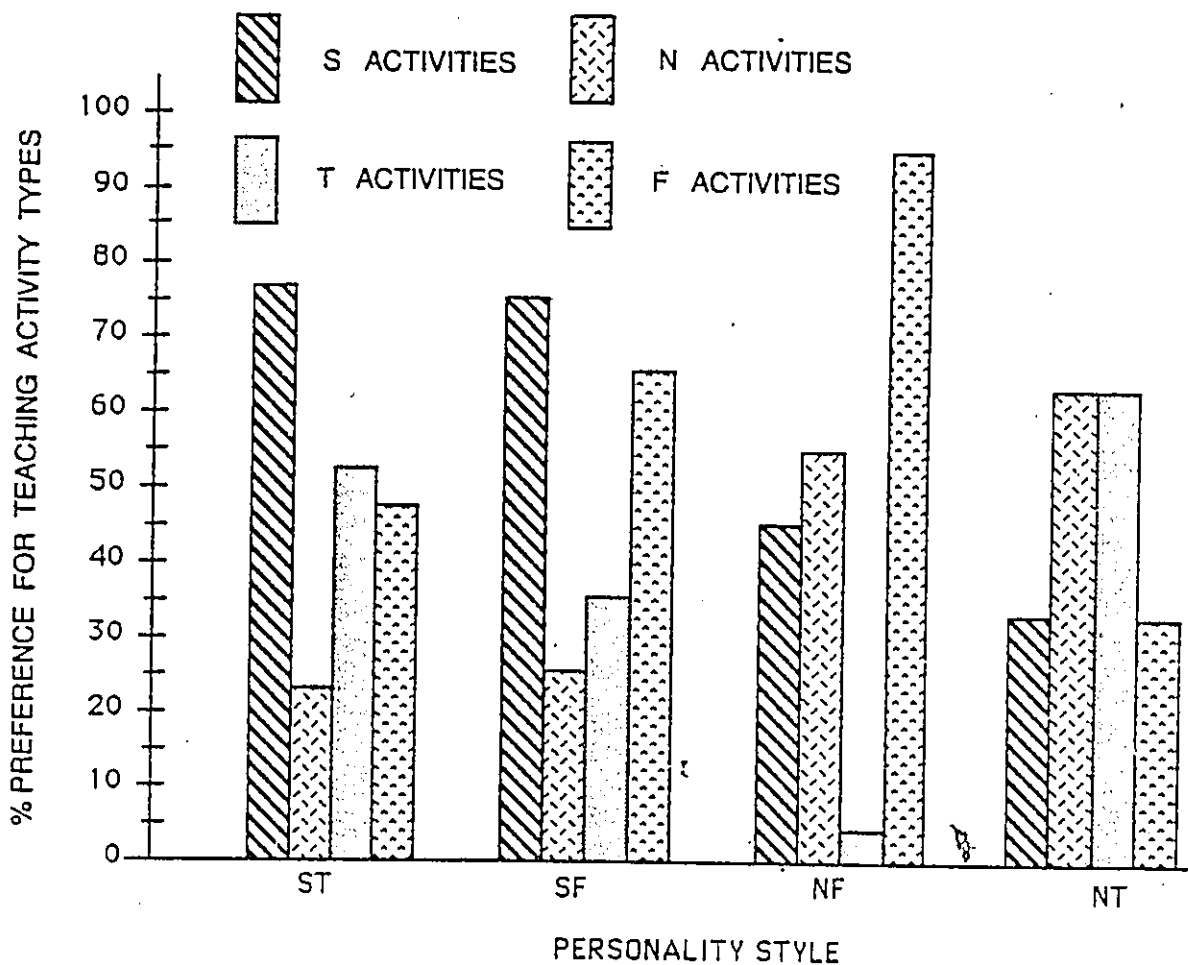


Figure 6 Match Between Personality Style and Preferences for Dichotomous Teaching Activity Types (SN ; TF)

Note.  $n = 17$  (ST).  $n = 20$  (SF).  $n = 20$  (NF).  $n = 3$  (NT).  
 ST = sensing/thinking. SF = sensing/feeling.  
 NF = intuitive/feeling. NT = intuitive/thinking.  
 S, N, T, F, are not all mutually exclusive.  
 S = sensing. N = intuiting. T = thinking. F = feeling.

for feeling activities; and 52.9% of the ST subjects and 66.7% of the NT subjects display a stronger preference for thinking activities. A possible explanation for the very strong NF preference is that establishing preferences itself is mainly an F activity, a process of making subjective judgements. The intuitives, being less cautious, more enthusiastic and more individualistic than the sensing subjects (Myers, 1985, p. 5) could be more prone to expressing their preferences more consistently. The NT subjects also support theory but due to sample size, these results must be accepted with caution.

The third descriptive pattern involves an analysis of the match between preference for dichotomous teaching activity types (SN ; TF) and dominant personality style functions (see Appendix H for a description of the process to determine the dominant function). Once again a frequency count was made of the number of times the subjects showed a preference for either S activities (ST/SF) or N activities (NF/NT), and for either T activities (ST/NT) or F activities (SF/NF) as indicated by the lower value of the preference function of each of the four comparisons (see Appendix F1 for the raw data). For this analysis, the subjects were grouped according to their dominant function (S, N, T, or F) rather than according to the usual grouping for the present study (ST, SF, NF, and NT).

There is a higher proportion of preference for

dichotomous teaching activities matched to the dominant personality style (Figure 7). A purely random preference would yield 50% of each of the S or N subjects preferring either sensing or intuitive types of activities and 50% of the T or F subjects preferring either thinking or feeling types of activities. The results in the present study show that 70.6% of the dominant sensing subjects prefer sensing activities; 72.7% of the dominant intuitive subjects prefer intuitive activities; 66.7% of the dominant thinking subjects prefer thinking activities; and 65.2% of the dominant feeling subjects prefer feeling activities. According to Jungian theory, the dominant function is the "ship's captain," the "governing force," or the best process which "dominates and unifies" one's life (Myers & Myers, 1985, p. 10). It is perceived to be more trustworthy and as a result has the opportunity to become the more mature and reliable psychological function acting as the cornerpost, or core of personality (Lawrence, 1983, p. 8). The findings of the present study indicate that preference for dichotomous teaching activity types are associated with the dominant personality function.

In summary, the findings associated with the Teaching Activity Preference Indicator support the hypothesis that preference for particular kinds of teaching activities varies with personality style. Yet, it is important to note that all of the findings gathered by way of descriptive analyses

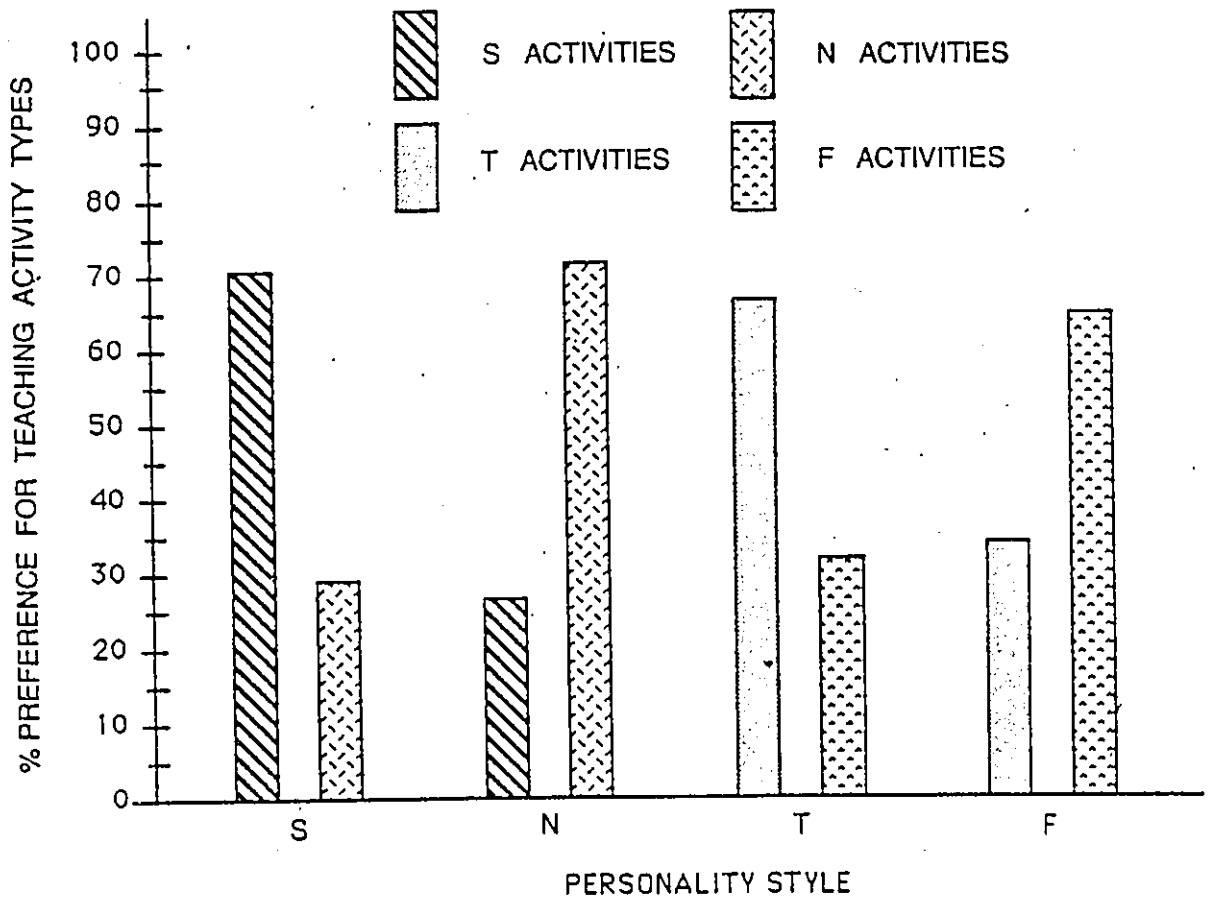


Figure 7 Match Between Dominant Personality Style and Preferences for Dichotomous Teaching Activity Types (SN ; TF)

Note.  $n = 17$  (S).  $n = 11$  (N).  $n = 9$  (T).  $n = 23$  (F).  
 S = sensing. N = intuiting. T = thinking. F = feeling.

in the present study only serve as signposts or avenues of generalizability to be tested empirically with larger samples.

The findings related to all three of the research questions of the present study are summarized in Chapter 6, which also includes an overview of the present study.

## Chapter 6

### Summary and Conclusions

Chapter 6 consists of a review of the study, a discussion of the contributions, limitations, and implications for practice, and suggestions for further research.

#### Review of the Study

A basic problem in effecting change is the compatibility between the program as intended and the program as perceived by the teachers. Implementation strategies are often planned from the administrator's point of view. Change agents at the system or local level may thus target their efforts towards overcoming the lack of appropriate teacher knowledge, skills, and attitudes. In other words, attention has been paid to the "what" and "how" of implementation without considering the "why" of implementation.

The purpose of the present study is to examine the complex and subtle relationships between implementation, teacher personality style, and program design. If people perceive and judge the same situation in different ways resulting in different behavior and needs, then it seems likely that these basic differences could also influence more specific behavior such as program implementation. Therefore, it is predicted that teachers implement programs having

assumptions compatible with their own teaching preferences to a higher degree than other types of programs because people act in a manner consistent with their beliefs. It is hypothesized that when there is a match between the type of person and the type of program, there is a higher degree of program implementation.

In order to test the above general hypothesis, it is necessary to find a unifying theory to produce compatible schemes of classification for both programs and people. This unifying theory is that of Jung. According to Jung, the act of perceiving is made up of sensing and intuiting. When people prefer sensing, they are more interested in what is tangible and real than they have little attention to spare for ideas coming faintly out of nowhere. Those people who prefer intuiting are more engrossed in pursuing the possibilities and meanings the situation presents that they seldom look very intently at the actualities. The act of judging is made up of thinking and feeling. The people who prefer thinking are more adept in the organization of facts and ideas while the people who prefer feeling are more adept at weighing the importance of alternatives for oneself and others. Each individual has an innate preference for sensing or intuiting and for thinking or feeling, which in turn allows one to sort people into different preference groups.

In more specific terms, personality style in the present study utilizing 60 primary teachers (grades 1 to 3) is

measured using the Myers-Briggs Type Indicator (Myers & McCaulley, 1985) and the program chosen is the Primary Environmental Studies Program. This research is organized around three questions concerning the relationship between personality style and three aspects of the implementation process (a) degree of program implementation, (b) type of program delivery, and (c) preference for teaching activity types. The first hypothesis, that the intuitive teachers implement the Primary Environmental Studies Program to a higher degree than the other teachers, was supported. This test involved the use of chi-square statistics generated from data gathered with a levels of use focused interview (Loucks et al., 1975). It was predicted that the intuitive teachers would implement the program more successfully because they would find it easier to implement the most difficult aspect of the program which is the integration component (teaching the content through themes). Further posthoc analyses also indicated that higher levels of implementation are associated with introverted subjects and feeling subjects, and that the number of years of teaching experience is not a significant factor in implementation.

The second hypothesis is that the degree of fidelity to the program as intended is predicted to be higher when there is a match between personality style and program component type. In order to test this hypothesis, an innovation configurations checklist (Heck et al., 1981) was designed

which resulted in the identification of three critical components (major operational features), each with a number of dimensions and variations. Using this methodology, an innovation profile for each subject was created to examine the relationship between personality style and the type of program delivery. Three sub-hypotheses were formulated to address the three critical components of the program which were classified in terms of Jungian theory (a) hands-on activity (sensing), (b) child-centred approach (feeling), and (c) integration (intuiting). The first sub-hypothesis, that sensing teachers display a higher degree of fidelity to the hands-on activity component of the program made up of two dimensions (kinds of material and student/teacher handling of the material), was not supported.

The second sub-hypothesis, that feeling teachers display a higher degree of fidelity to the child-centred component of the program made up of three dimensions (kinds of student choice, type of planning, and classroom setup), was also not supported. Yet, a significant association between type of planning and personality style was found when type of planning was reclassified as an integration component rather than a feeling component. In this case, intuitive feeling/thinking teachers emphasized planning for individual students more than sensing/thinking teachers.

The third sub-hypothesis, that intuitive teachers display a higher degree of fidelity to the integration

component of the program made up of three dimensions (kinds of integration, kinds of scheduling, and use of activity centres), was supported. Further posthoc analyses also indicated that intuitive feeling/thinking subjects utilized more integration, displayed more flexible timetabling, and utilized activity centres to a higher degree than sensing/thinking subjects and sensing/feeling subjects.

The third hypothesis, that the preference for particular kinds of teaching activities is predicted to be higher when there is a match between teaching activity type and personality style, was partially supported. Using a researcher-designed questionnaire, the Teaching Activity Preference Indicator, and a Tukey Multiple Pairwise Comparison, it was found that both sensing/thinking and sensing/feeling teachers displayed a significantly higher preference for sensing/thinking activities than intuitive feeling/thinking teachers. The reverse pattern was observed for intuitive/feeling activities. Using a MANOVA procedure, no significant differences were found among the personality styles for sensing/feeling or intuitive/thinking activities; and the intuitive/thinking activities were the least preferred by all. Furthermore, the findings generated by the descriptive analyses indicate that there is an association between preference for dichotomous teaching activity types (SN ; TF) and personality style. For example, the sensing/thinking teachers preferred sensing activities and

thinking activities. The other subjects also displayed a preference pattern matched to their own types. In addition, there was also an association between preference for dichotomous teaching activity types (SN ; TF) and dominant personality style functions. The sensing, intuiting, thinking, and feeling subjects displayed preferences for sensing, intuiting, thinking, and feeling activities respectively. Yet, there is a need to use larger sample sizes to verify the above results empirically.

#### Contributions and Limitations of the Study

The findings of the present study contribute to the literature relative to curriculum implementation and teacher personality styles. Empirical support is given for the classification of program components using a Jungian framework. Fullan (1983) summarized the factors related to implementation under four categories: (a) attributes of the program itself; (b) implementation strategies; (c) district and school factors; and (d) extraneous factors such as changes in district leadership, teacher strikes, population shifts, and funding changes (p. 222). The results of the present study indicate that personality style is another factor to consider in the implementation process. In addition, some specific research priorities identified in the

review of the literature are addressed, namely, the need to investigate a wider number of personality dimensions, to relate individual teacher responses to curriculum components, to utilize larger sample sizes, and to find out if the years of teaching experience is a significant factor.

With reference to personality style, Myers and McCaulley (1985, p. 133) state that much needs to be learned about teaching preferences and the extent to which individuals can adopt teaching strategies that do not come naturally. The MBTI has been used to analyze curricula, methods, media, and materials in light of the needs of different types of people (p. 4). The present study extends the application of the MBTI to study curriculum implementation and contributes to a validation of the classification of teaching activities using a Jungian framework. It also offers some support for the influence of the dominant personality function, which serves as a governing force, but which has not been researched extensively. The findings gathered from descriptive analyses indicate that preference for types of teaching activities are associated with this function. Another contribution is the operationalization of the research questions themselves. The aim was to develop a methodology in order to classify people and program components so that research intended to investigate the relationship between these two variables could be facilitated. More specifically, a focused interview, an innovation configurations profile, and a system

of classifying activities (Teaching Activity Preference Indicator developed for the present study) may be used along with the MBTI to investigate the relationship between implementation and personality style with other types of programs or program components.

On the other hand, the results of the present study are limited in that intuitive/thinking subjects are underrepresented in the sample because these types of individuals are rare at the primary level. Furthermore, the generalizability of the results is limited to one primary environmental studies program in a large school board having both rural and urban populations. Yet, it is important to note that the critical components (hands-on activity, child-centred approach, and integration) are not program specific which increases the potential generalizability of the results by inference to other types of programs.

#### Implications for Practice

The findings of the present study show that personality style is a factor in the implementation process. This lends support to the literature written about teacher self-understanding and professionalism, the curriculum cycle, and the improvement of student learning. Hall and Nordby (1973), in quoting Jung, state that the influence of the

teacher on the personality development of the students is of equal importance to the influence on intellectual accomplishments. Thus, teachers need to know their own personalities (p. 87). This increased self-awareness may also contribute to creating better working relationships resulting in higher degrees of program implementation. Gauld and Sink (1985, pp. 25-27) state that type theory teaches that a threatening climate typically occurs when opposite types collide. This can be alleviated by an understanding of the strengths and weaknesses of individual personality styles. Principals, as curriculum leaders responsible for implementation, may benefit from this kind of information to effect a set of leadership styles contingent not only on environmental demands, but also on the personality make-up of the teachers.

In writing about schools as social organizations, Houlihan (1983, pp. 11-14) suggests that the lower level, most basic needs must be met before meeting higher level needs. This hierarchy includes relationships, self-concept, attitudes, and performance. Effective schools are founded on positive relationships so that school pride and loyalty develop. A positive self-concept influences the formation of positive attitudes which may affect performance because the self-worth and attitudes of teachers or students play as strong or a stronger role in performance than ability. The components of Houlihan's hierarchy may be classified as what


Werner (1980b) calls "the contextual (and messy) things that are part of any implementation process" (p. 147).

What is required is the creation of a working environment which supports teacher professionalism, the ability to deliver a program in such a way that the underlying philosophy and objectives of the program are followed while at the same time changes are made to meet individual student needs. Fullan and Connelly (1987) maintain that theory and practice must become interconnected in the minds of teachers (p. 47). They suggest that "we must move to ways of thinking, and to plans and programs, by which teachers may reflect on themselves as knowing, teaching, beings" and they advocate a process of professional interaction, action, and reflection (p. 49). This does not represent a search for change tactics but rather for ways to enhance teacher professionalism. Traditionally, implementation concerns have been addressed from a system perspective. The findings of the present study indicate that these concerns may also be addressed from a teacher perspective. As professionals, teachers may be viewed as a positive implementation force engaging in an analysis of (a) their own personalities, (b) curriculum documents, (c) their own teaching preferences, and (d) the individual needs of their students to make defensible curriculum choices.

There is a need to become more sensitive to the underlying assumptions of implementation strategies, to how

teachers are viewed, and to the practical implications of proposed program changes in the classroom. If the inservice is conducted only from a system perspective to correct inadequate teacher skills, knowledge, and attitudes, it may be more detrimental than helpful. Any type of inservice or implementation strategy which has the potential to erode teacher self-confidence and morale is a disservice. Both pressure and support are needed to encourage teachers to try out new ways of managing the teaching/learning process to further implement programs.

Referring specifically to the present study, one may ask how teachers can be helped to become better implementers of the Primary Environmental Studies Program. The majority of the primary teachers are sensing/judging teachers while the program has a strong intuitive component. McCaulley and Natter (1980, p. 184) state that sensing/judging teachers work best when they can use past experience, focus on the facts, and have order. Since they are not, by nature, innovators, they tend to suspect new ideas until they have seen them proven. The current "revolution" in the schools can be expected to be hardest of all on the teachers of this type because it makes them feel they can no longer trust experience, and are not on solid ground. One effect of the stress of change on these types is a greater rigidity than they themselves prefer. Another very important concern is that these teachers are in danger of losing confidence in



their teaching abilities or they may become frustrated with curriculum demands. These issues affect the planning of professional development opportunities. Teachers need to be affirmed in their own preferred manner of managing the teaching/learning process and then be invited to utilize other methodologies to meet the diverse needs of the students. Perhaps, programs could be written including a balance of different types of activities thereby increasing their appeal to a wide cross-section of teachers.

Another implication for practice arising out of the present study is that there is a need to focus on how students learn rather than to just how much they have learned. Students have particular personality styles which determine particular learning needs. McCaulley and Natter (1980, pp. 204-5) state that students need to have a good command of sensing, intuiting, thinking, and feeling skills. For each student, two of these processes come more easily and two are more difficult to use. Teachers who understand type can help students by strengthening the functions that come naturally and helping them to develop the others.

It is also important not to imply that particular teaching and learning methods or personality styles are to be preferred. There is no one best method or personality style because there is a variety of needs to be met. Hammer (1985) states that by definition, the mode of perception we prefer determines how we see the world, including how we view

individuals with opposite preferences. It is difficult to appreciate others who have preferences different from our own because we are biased by how these preferences are manifested in ourselves. As an example he states that "many intuitives believe that all sensing is like their own, whereas truly developed and differentiated sensing is so much more.

Attempting to describe another's well developed preference on the basis of one's own less developed one is analogous to a life-long resident of the tropics attempting to describe an Eskimo's experience of snow" (p. 17). These differences in perception affect behavior in general and as is shown in the present study they also affect the degree and type of program implementation. In the present study, the intuitive teachers implemented the Primary Environmental Studies Program to a higher degree because this program has a strong intuitive component. The results could be reversed in studies examining other types of programs.

#### Suggestions for Further Research

Further research more clearly documenting the use of different kinds of materials, the amount of materials the students are handling, the amount of choice students are given, and preferred classroom setups is needed. Are the materials used mainly for such activities as observing,

touching, and measuring as designated by the programs or are the materials used in innovative ways to encourage the students to develop their creativity by designing their own activities? How does personality style affect classroom management? Which teachers promote more student choice and independence? Which teachers prefer particular types of classroom setups? Perhaps the classroom observation mode may be more useful for answering some of these questions.

The methodology developed in the present study may also be applied to the analysis of other program components such as philosophy, objectives, or evaluation methods. What is the impact on student achievement when students, teachers, and programs are matched? What are the advantages and disadvantages of this approach? Are some teachers naturally more flexible than others or more willing to use a variety of strategies? Which teachers are more consistent in their preferences? Are the teaching methods adopted by the teachers a reflection of learning style preferences? How are the teaching activities suggested in programs adapted by teachers? Does personality style affect the subject specialities chosen by teachers?

There is also a need to use larger sample sizes to test empirically the findings gathered by the descriptive analyses (i.e. the relationship between personality style and preference for dichotomous teaching activity types, and on the influence of the dominant personality style function).

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12. Higher preference scores do not necessarily mean that an individual has necessarily developed a particular attitude or function to a higher degree than someone else. A larger score simply means that when forced to choose, one is more clear about what he or she prefers. On the other hand, it may be reasonable to expect that those who report clear preference may be more likely to develop the skills associated with the preference because the skills may have been exercised to a greater extent. Some individuals interpret low scores as an advantage, equating this with equal excellence in both poles. In reality such scores are more often a reflection of tension between the opposite poles of preference (Myers & McCaulley, 1985, p. 58).
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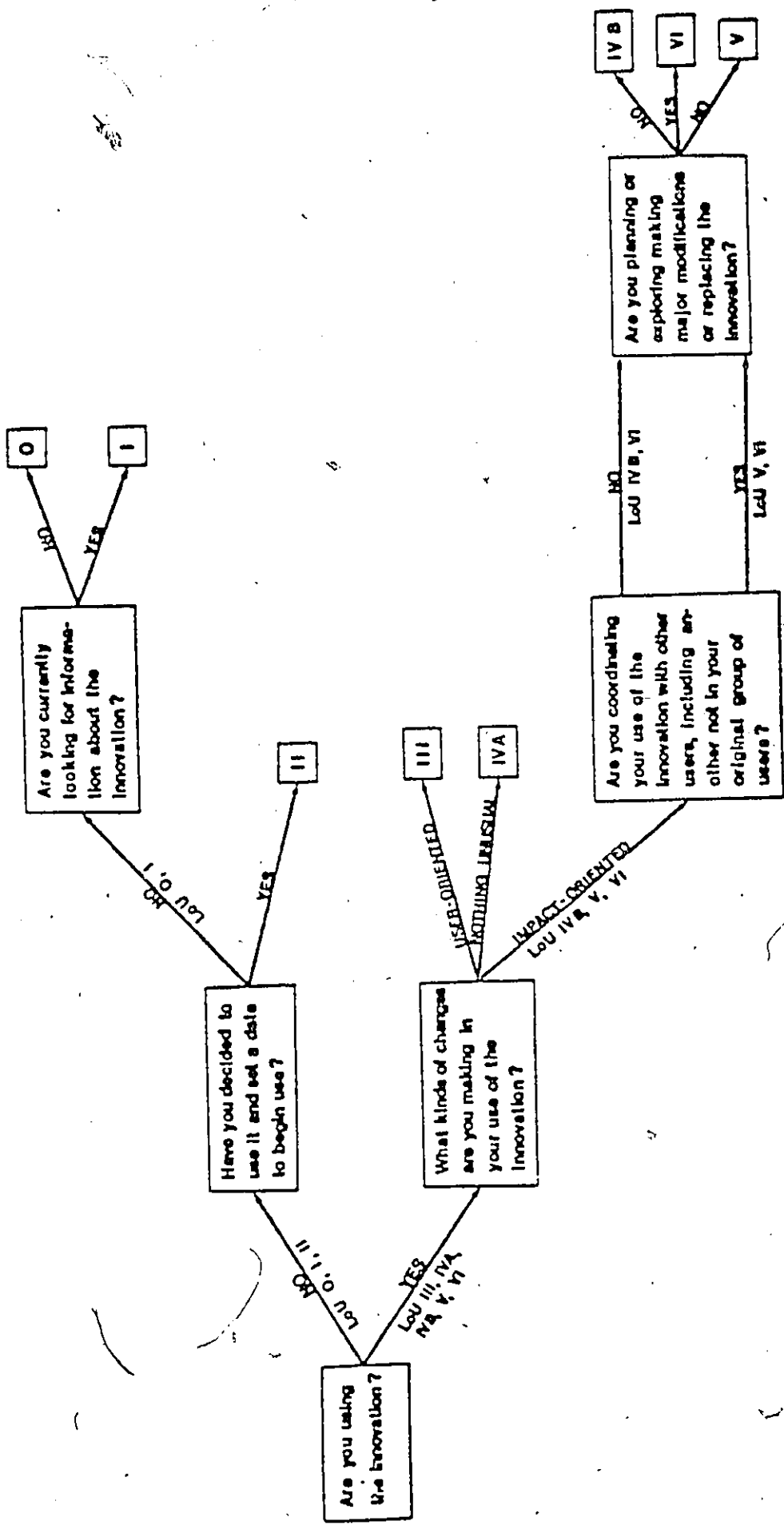
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| LEVELS OF USE  |  | CATEGORIES   |  |   |
|--|--|--|--|---|
| SCALE POINT<br>DEFINITIONS OF THE<br>LEVELS OF USE<br>OF THE INNOVATION  |  | KNOWLEDGE  | ACQUIRING INFORMATION  | SHARING   |
| <p>Levels of Use are distinct stages that represent observably different types of behavior and patterns of innovation use as exhibited by individuals and groups. These levels characterize a user's development in acquiring new skills and varying use of the innovation. Each level encompasses a range of behaviors, but is limited by a set of identifiable Decision Points. For descriptive purposes, each level is defined by seven categories.</p> |  | <p>That which the user knows about characteristics of the innovation, how to use it, and consequences of its use. This is cognitive knowledge related to using the innovation, not feelings or attitudes.</p> <p>Solicits information about the innovation in a variety of ways, including questioning resource persons, corresponding with resource agencies, reviewing printed materials, and making visits.</p> <p>Discusses the innovation with others. Shares plans, ideas, resources, outcomes, and problems related to use of the innovation.</p> |  |   |
| <b>LEVEL 0</b><br>NON-USE: State in which the user has little or no knowledge of the innovation, no involvement with the innovation, and is doing nothing toward becoming involved.  |  | Knows nothing about this or similar innovations or has only very limited general knowledge of efforts to develop innovations in the area.  | Takes little or no action to solicit information beyond reviewing descriptive information about this or similar innovations when it happens to come to personal attention. | Is not communicating with others about the innovation beyond possibly acknowledging that the innovation exists.   |
| <b>DECISION POINT A</b>  |  | Takes action to learn more detailed information about the innovation.  |  |   |
| <b>LEVEL I</b><br>ORIENTATION: State in which the user has acquired or is acquiring information about the innovation and/or has explored or is exploring its value orientation and its demands upon user and user system.  |  | Knows general information about the innovation such as origin, characteristics, and implementation requirements.   | Seeks descriptive material about the innovation. Seeks opinions and knowledge of others through discussions, visits, or workshops.   | Discusses the innovation in general terms and/or exchanges descriptive information, materials, or ideas about the innovation and possible implications of its use.  |
| <b>DECISION POINT B</b>  |  | Makes a decision to use the innovation by establishing a time to begin.  |  |   |
| <b>LEVEL II</b><br>PREPARATION: State in which the user is preparing for first use of the innovation.  |  | Knows logistical requirements, necessary resources and timing for initial use of the innovation, and details of initial experiences for clients.   | Seeks information and resources specifically related to preparation for use of the innovation in own setting.  | Discusses resources needed for initial use of the innovation. Joins others in pre-use training, and in planning for resources, logistics, schedules, etc., in preparation for first use.                            |
| <b>DECISION POINT C</b>  |  | Begins first use of the innovation.  |  |   |
| <b>LEVEL III</b><br>MECHANICAL USE: State in which the user focuses most effort on the short-term, day-to-day use of the innovation with little time for reflection. Changes in use are made more to meet user needs than client needs. The user is primarily engaged in a stepwise attempt to master the tasks required to use the innovation, often resulting in disjointed and superficial use.   |  | Knows on a day-to-day basis the requirements for using the innovation, is more knowledgeable on short-term activities and effects than long-range activities and effects of use of the innovation.   | Solicits management information about such things as logistics, scheduling techniques, and ideas for reducing amount of time and work required of user.                    | Discusses management and logistical issues related to use of the innovation. Resources and materials are shared for purposes of reducing management, flow and logistical problems related to use of the innovation. |
| <b>DECISION POINT D-1</b>  |  | A routine pattern of use is established.   |  |   |
| <b>LEVEL IV A</b><br>ROUTINE: Use of the innovation is stabilized. Few if any changes are being made in ongoing use. Little preparation or thought is being given to improving innovation use or its consequences.   |  | Knows both short- and long-term requirements for use and how to use the innovation with minimum effort or stress.  | Makes no special efforts to seek information as a part of ongoing use of the innovation.   | Describes current use of the innovation with little or no reference to ways of changing use.  |
| <b>DECISION POINT D-2</b>  |  | Changes use of the innovation based on formal or informal evaluation in order to increase client outcomes.   |  |   |
| <b>LEVEL IV B</b><br>REFINEMENT: State in which the user varies the use of the innovation to increase the impact on clients within immediate sphere of influence. Variations are based on knowledge of both short- and long-term consequences for clients.   |  | Knows cognitive and effective effects of the innovation on clients and ways for increasing impact on clients.  | Solicits information and materials that focus specifically on changing use of the innovation to affect client outcomes.  | Discusses own methods of modifying use of the innovation to change client outcomes.   |
| <b>DECISION POINT E</b>  |  | Initiates changes in use of innovation based on input of and in coordination with what colleagues are doing.   |  |   |
| <b>LEVEL V</b><br>INTEGRATION: State in which the user is combining own efforts to use the innovation with related activities of colleagues to achieve a collective impact on clients within their common sphere of influence.   |  | Knows how to coordinate own use of the innovation with colleagues to provide a collective impact on clients.   | Solicits information and opinions for the purpose of collaborating with others in use of the innovation.   | Discusses efforts to increase client impact through collaboration with other on personal use of the innovation.   |
| <b>DECISION POINT F</b>  |  | Begins exploring alternatives to or major modifications of the innovation presently in use.  |  |   |
| <b>LEVEL VI</b><br>RENEWAL: State in which the user re-evaluates the quality of use of the innovation, seeks major modifications of or alternatives to present innovation to achieve increased impact on clients, examines new developments in the field, and explores new goals for self and the system.  |  | Knows of alternatives that could be used to change or replace the present innovation that would improve the quality of outcomes of its use.  | Seeks information and materials about other innovations as alternatives to the present innovation or for making major adaptations in the innovation.                       | Focuses discussions on identification of major alternatives or replacements to the current innovation.  |

## CATEGORIES

| ASSESSING  | PLANNING   | STATUS REPORTING   | PERFORMING  |
|--|--|--|---|
| Examines the potential or actual use of the innovation or some aspect of it. This can be a mental assessment or can involve actual collection and analysis of data.                            | Designs and outlines short- and/or long-range steps to be taken during process of innovation adoption. Lists needed resources, schedules activities, meets with others to organize and/or coordinate use of the innovation.  | Describes personal stand at the present time in relation to use of the innovation.   | Carries out the actions and activities entailed in operationalizing the innovation.   |
| Takes no action to analyze the innovation, its characteristics, possible use, or consequences of use.  | Schedules no time, and specifies no steps for the study or use of the innovation.  | Reports little or no personal involvement with the innovation.   | Takes no discernible action toward learning about or using the innovation. The innovation and/or its accoutrements are not present or in use.   |
| Analyzes and compares materials, content, requirements for use, evaluation reports, potential outcomes, strengths and weaknesses for purpose of making a decision about use of the innovation. | Plans to gather necessary information and resources as needed to make a decision for or against use of the innovation.   | Reports presently orienting self to what the innovation is and is not.   | Explores the innovation and requirements for its use by talking to others about it, reviewing descriptive information and sample materials, attending orientation sessions, and observing others using it.  |
| Analyzes detailed requirements and available resources for initial use of the innovation.  | Identifies steps and procedures entailed in obtaining resources and organizing activities and events for initial use of the innovation.  | Reports preparing self for initial use of the innovation.  | Studies reference materials in depth, organizes resources and logistics, schedules and receives skill training in preparation for initial use.  |
| Examines own use of the innovation with respect to problems of logistics, management, time, schedules, resources, and general reactions of clients.  | Plans for organizing and managing resources, activities, and events related primarily to immediate ongoing use of the innovation. Planned-for changes address managerial or logistical issues with a short-term perspective. | Reports that logistics, time, management, resource organization, etc., are the focus of most personal efforts to use the innovation. | Manages innovation with varying degrees of efficiency. Often lacks anticipation of immediate consequences. The flow of actions in the user and clients is often disjointed, uneven and uncertain. When changes are made they are primarily in response to logistical and organizational problems. |
| Limits evaluation activities to those administratively required, with little attention paid to findings for the purpose of changing use.   | Plans intermediate and long-range actions with little projected variation in how the innovation will be used. Planning focuses on routine use of resources, personnel, etc.  | Reports that personal use of the innovation is going along satisfactorily with few if any problems.                                  | Uses the innovation smoothly with minimal management problems. Over time, there is little variation in pattern of use.  |
| Assesses use of the innovation for the purpose of changing current practices to improve client outcomes.   | Develops intermediate and long-range plans that anticipate possible and needed steps, resources, and events designed to enhance client outcomes.   | Reports varying use of the innovation in order to change client outcomes.  | Explores and experiments with alternative combinations of the innovation with existing practices to maximize client involvement and to optimize client outcomes.  |
| Appraises collaborative use of the innovation in terms of client outcomes and strengths and weaknesses of the integrated effort.   | Plans specific actions to coordinate own use of the innovation with others to achieve increased impact on clients.   | Reports spending time and energy collaborating with others about integrating own use of the innovation.                              | Collaborates with others in use of the innovation as a means for expanding the innovation's impact on clients. Changes in use are made in coordination with others.   |
| Analyzes advantages and disadvantages of major modifications or alternatives to the present innovation.  | Plans activities that involve pursuit of alternatives to enhance or replace the innovation.  | Reports considering major modifications of or alternatives to present use of the innovation.   | Explores other innovations that could be used in combination with or in place of the present innovation in an attempt to develop more effective means of achieving client outcomes.   |

Note. From "Levels of use of the innovations: A framework for analyzing innovation adoption" by Hall et al., 1975, Journal of Teacher Education, 26(1), pp. 54-55.



Appendix B Branching Format of the LoU Interview  
 Note. From Measuring Levels of use of the innovation: A manual for trainers, interviewers, and raters (p. 22) by Loucks et al., 1975, Austin: University of Texas, Research & Development Center for Teacher Education.

Appendix C Levels of Use of the Innovation: 194  
 Typical Behaviors

|                                 | LEVEL OF USE       | BEHAVIORAL INDICES OF LEVEL   |
|---------------------------------|--------------------|---|
| U<br>S<br>E<br>R                | VI RENEWAL         | THE USER IS SEEKING MORE EFFECTIVE ALTERNATIVES TO THE ESTABLISHED USE OF THE INNOVATION. |
|                                 | V INTEGRATION      | THE USER IS MAKING DELIBERATE EFFORTS TO COORDINATE WITH OTHERS IN USING THE INNOVATION.  |
|                                 | IVB REFINEMENT     | THE USER IS MAKING CHANGES TO INCREASE OUTCOMES.  |
|                                 | IVA ROUTINE        | THE USER IS MAKING FEW OR NO CHANGES AND HAS AN ESTABLISHED PATTERN OF USE.               |
| N<br>O<br>N<br>U<br>S<br>E<br>R | III MECHANICAL USE | THE USER IS MAKING CHANGES TO BETTER ORGANIZE USE OF THE INNOVATION.                      |
|                                 | II PREPARATION     | THE INDIVIDUAL IS PREPARING TO USE THE INNOVATION.  |
|                                 | I ORIENTATION      | THE INDIVIDUAL IS SEEKING INFORMATION ABOUT THE INNOVATION.                               |
|                                 | 0 NONUSE           | NO ACTION IS BEING TAKEN WITH RESPECT TO THE INNOVATION.                                  |

Note. From a Concerns-based Consulting Skills Workshop (CBAM Project) presented by Suzanne M. Steigelbauer, May 5-6, 1986 in Toronto. The material is taken from Austin: University of Texas, Research and Development Center for Teacher Education.

| Page #:<br>Date: / /                            |                          | Site:<br>I.D. #:      |         | Interviewer:<br>Rater:          |          |                  |            |             |   |   |   |                             |
|---|--------------------------|-----------------------|---------|---------------------------------|----------|------------------|------------|-------------|---|---|---|-----------------------------|
| Level   | Knowledge                | Acquiring Information | Sharing | Assessing                       | Planning | Status Reporting | Performing | Overall LoU |   |   |   |                             |
| Non-Use   | 0                        | 0                     | 0       | 0                               | 0        | 0                | 0          | 0           |   |   |   |                             |
| D.P. A  | I                        | I                     | I       | I                               | I        | I                | I          | I           |   |   |   |                             |
| D.P. B  | II                       | II                    | II      | II                              | II       | II               | II         | II          |   |   |   |                             |
| D.P. C  | III                      | III                   | III     | III                             | III      | III              | III        | III         |   |   |   |                             |
| Technical Use                                   | IV                       | IV                    | IV      | IV                              | IV       | IV               | IV         | IV          |   |   |   |                             |
| D.P. D-1  | IVB                      | IVB                   | IVB     | IVB                             | IVB      | IVB              | IVB        | IVB         |   |   |   |                             |
| D.P. D-2  | V                        | V                     | V       | V                               | V        | V                | V          | V           |   |   |   |                             |
| D.P. E  | VI                       | VI                    | VI      | VI                              | VI       | VI               | VI         | VI          |   |   |   |                             |
| D.P. F  | ND                       | ND                    | ND      | ND                              | ND       | ND               | ND         | ND          |   |   |   |                             |
| Integration                                     | NI                       | NI                    | NI      | NI                              | NI       | NI               | NI         | NI          |   |   |   |                             |
| General   |                          |                       |         |                                 |          |                  |            |             |   |   |   |                             |
| User is not doing:                              |                          |                       |         |                                 |          |                  |            |             |   |   |   |                             |
| to information in interview:                    |                          |                       |         |                                 |          |                  |            |             |   |   |   |                             |
| past User                                       | Estimated past LoU _____ |                       |         |                                 |          |                  |            |             |   |   |   |                             |
| the amount of information in the interview was: |                          |                       |         | Insufficient for rating         | 1        | 2                | 3          | 4           | 5 | 6 | 7 | very adequate for rating    |
| the interviewee:                                |                          |                       |         | does not fit on the chart       | 1        | 2                | 3          | 4           | 5 | 6 | 7 | fits well on the chart      |
| the interviewee:                                |                          |                       |         | was very difficult to interview | 1        | 2                | 3          | 4           | 5 | 6 | 7 | was no problem in interview |

Note. From a Concerns-based Consulting Skills Workshop (CBAM Project) presented by Suzanne M. Steigelbauer, May 5-6, 1986 in Toronto. The material is taken from Austin: University of Texas, Research and Development Center for Teacher Education.

The Myers-Briggs Type Indicator (Form G) is a 126-item questionnaire which is intended to show how people like to look at things and how they like to go about deciding things. There are no "right" or "wrong" answers to the questions. The subjects are asked to read each question carefully and to mark their answers on separate answer sheets. Part I is made up of 26 questions. For example, a subject is asked:

Do you usually  
(A) show your feelings freely, or  
(B) keep your feelings to yourself?

Part II is made up of 45 word pairs and the subject is asked to think about what the words mean, rather than how they look or sound. For example, a subject is asked to indicate which word is more appealing:

(A) uncritical critical (B)

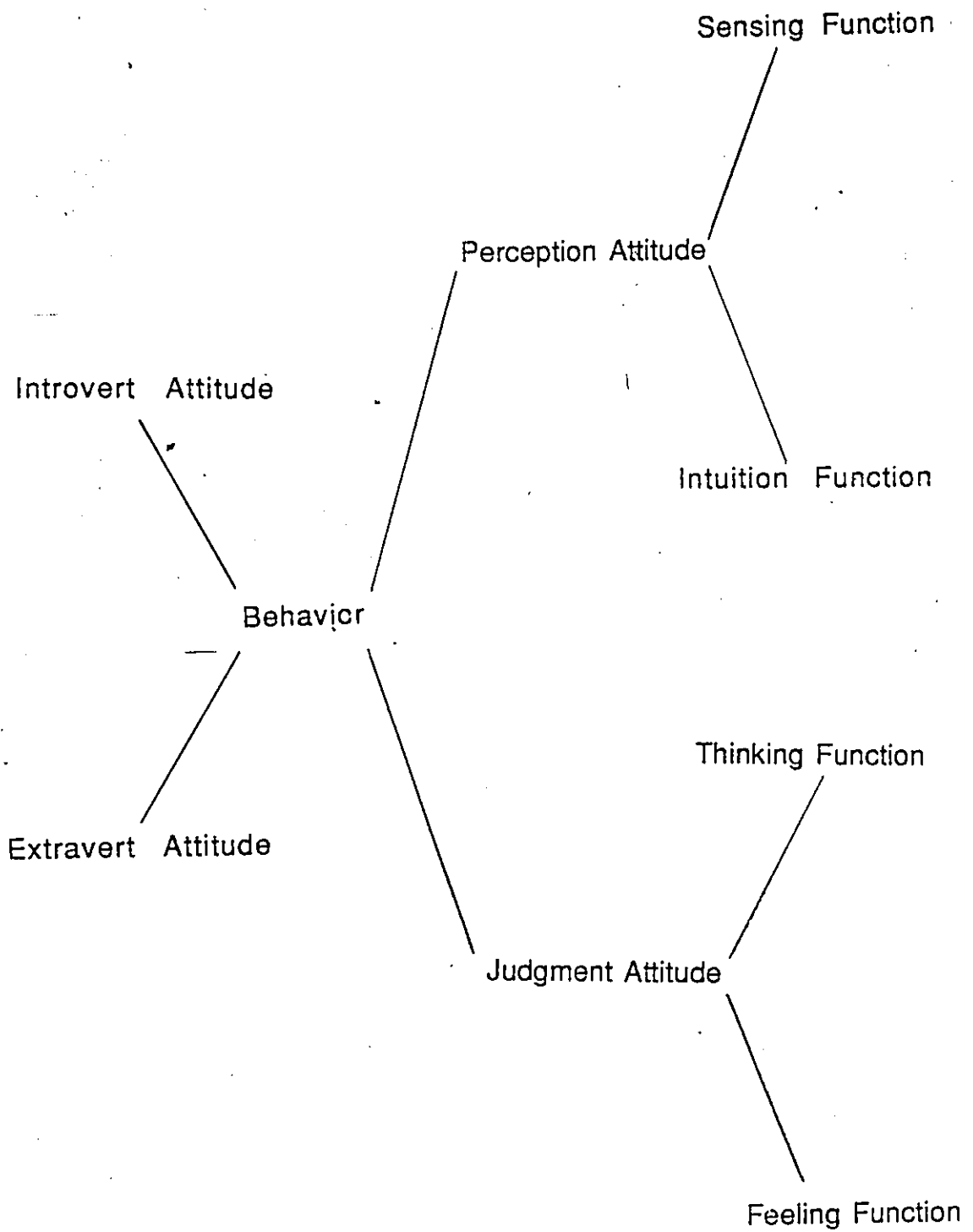
Part III is composed of more questions similar to Part I. An example of one of the questions is:

Would you rather  
(A) support the established methods of doing good, or  
(B) analyze what is still wrong and attack unsolved problems?

The subjects are directed not to think too long about any one question and to skip questions if a decision cannot be made.

The questionnaire is available from Consulting Psychologists Press, Inc. 577 College Ave., Palo Alto, California, 94306.

Measured by the MBTI



SENSING TYPES                      INTUITIVE TYPES  
 with THINKING   with FEELING   with FEELING   with THINKING

|             |             |             |             |  |
|-------------|-------------|-------------|-------------|--|
| <u>ISTJ</u> | <u>ISFJ</u> | <u>INFJ</u> | <u>INTJ</u> | JUDGING<br><br>INTROVERTS<br><br>PERCEPTIVE<br><br>PERCEPTIVE<br><br>EXTRAVERTS<br><br>JUDGING |
| N=<br>%=    | N=<br>%=    | N=<br>%=    | N=<br>%=    |  |
| <u>ISTP</u> | <u>ISFP</u> | <u>INFP</u> | <u>INTP</u> |  |
| N=<br>%=    | N=<br>%=    | N=<br>%=    | N=<br>%=    |  |
| <u>ESTP</u> | <u>ESFP</u> | <u>ENFP</u> | <u>ENTP</u> |  |
| N=<br>%=    | N=<br>%=    | N=<br>%=    | N=<br>%=    |  |
| <u>ESTJ</u> | <u>ESFJ</u> | <u>ENFJ</u> | <u>ENTJ</u> |  |
| N=<br>%=    | N=<br>%=    | N=<br>%=    | N=<br>%=    |  |

For all types, the dominant function is used in the preferred extraverted or introverted world. The auxiliary function provides balance to the personality and is used in the other less preferred world. Myers & Myers (1985, pp. 15-16) state that the JP preference can be used to determine the dominant function but it must be used differently with extraverts and introverts because the JP attitude reflects only the preference used in the outside world. If an extravert's type ends in J, the dominant function is a judging one, either T or F; if it ends in a P, the dominant function is a perceptive one, either S or N (see Appendix F). For example, the dominant function of an ENTJ is thinking.

On the other hand, the exact opposite is true for introverts. Introverts use their dominant function in their inner world while extraverts use their dominant function in their outer world. Therefore, the J or P attitude reflects their auxiliary function instead of the dominant function. For example, the dominant function of an ISFP is feeling because the P reflects the auxiliary sensing function in the outer world (see the underlined dominant functions in the MBTI table in Appendix G). For a more detailed explanation for determining the dominant, auxiliary, third, and fourth functions, refer to the MBTI manual (Myers & McCaulley, 1985, pp. 15-19).

**Appendix I MBTI Atlas Type Table for  
Elementary Teachers**

N = 804

| SENSING   |   | INTUITION                                      |   | N  | %   |
|---|---|--|---|--|---|
| THINKING  | FEELING   | FEELING  | THINKING                                  |  |   |
| <b>ISTJ</b><br>N= 86<br>%= 10.70<br>■■■■■■■■■■<br>■ | <b>ISFJ</b><br>N= 144<br>%= 17.91<br>■■■■■■■■■■<br>■■■■■■■■■■ | <b>INFJ</b><br>N= 41<br>%= 5.10<br>■■■■■■      | <b>INTJ</b><br>N= 17<br>%= 2.11<br>■■     | JUDGMENT<br>INTRAVERSION<br>PERCEPTION<br>PERCEPTION<br>EXTRAVERSION<br>JUDGMENT | <b>E</b> 415 51.62<br><b>I</b> 389 48.38<br><b>S</b> 503 62.56<br><b>N</b> 301 37.44<br><b>T</b> 258 32.09<br><b>F</b> 546 67.91<br><b>J</b> 556 69.15<br><b>P</b> 248 30.85<br><br><b>IJ</b> 288 35.82<br><b>IP</b> 101 12.56<br><b>EP</b> 147 18.28<br><b>EJ</b> 268 33.33<br><br><b>ST</b> 175 21.77<br><b>SF</b> 328 40.80<br><b>NF</b> 218 27.11<br><b>NT</b> 83 10.32<br><br><b>SJ</b> 398 49.50<br><b>SP</b> 105 13.06<br><b>NP</b> 143 17.79<br><b>NJ</b> 158 19.65<br><br><b>TJ</b> 213 26.49<br><b>TP</b> 45 5.60<br><b>FP</b> 203 25.25<br><b>FJ</b> 343 42.66<br><br><b>IN</b> 107 13.31<br><b>EN</b> 194 24.13<br><b>IS</b> 282 35.07<br><b>ES</b> 221 27.49<br><br><b>ET</b> 129 16.04<br><b>EF</b> 286 35.57<br><b>IF</b> 260 32.34<br><b>IT</b> 129 16.04<br><br><b>S dom</b> 283 35.20<br><b>N dom</b> 152 18.91<br><b>T dom</b> 136 16.92<br><b>F dom</b> 233 28.98 |
| <b>ISTP</b><br>N= 14<br>%= 1.74<br>■■               | <b>ISFP</b><br>N= 38<br>%= 4.73<br>■■■■■■                     | <b>INFP</b><br>N= 37<br>%= 4.60<br>■■■■■■      | <b>INTP</b><br>N= 12<br>%= 1.49<br>■      |  |   |
| <b>ESTP</b><br>N= 7<br>%= .87<br>■                  | <b>ESFP</b><br>N= 46<br>%= 5.72<br>■■■■■■                     | <b>ENFP</b><br>N= 82<br>%= 10.20<br>■■■■■■■■■■ | <b>ENTP</b><br>N= 12<br>%= 1.49<br>■      |  |   |
| <b>ESTJ</b><br>N= 68<br>%= 8.46<br>■■■■■■■■■■       | <b>ESFJ</b><br>N= 100<br>%= 12.44<br>■■■■■■■■■■<br>■■         | <b>ENFJ</b><br>N= 58<br>%= 7.21<br>■■■■■■      | <b>ENTJ</b><br>N= 42<br>%= 5.22<br>■■■■■■ |  |   |

Note: ■ = 1% of sample 8629419

This table is one of a series of tables from the CAPT-MBTI Data Bank of MBTI records submitted to CAPT for computer scoring between 1971 and June, 1984. This sample was drawn from 59,784 records with usable occupational codes from the total data bank of 232,557. This data bank has 51% Form F cases from 1971 to March, 1978, 35% Form F cases from 1978 to June, 1984 and 14% Form G cases from 1978 to December, 1982. An analysis of Form F and G data banks showed the data banks were comprised of 56% females and 44% males; education level completed: 6% some grade school, 30% high school diploma, 25% some college, 18% bachelor degrees, 11% masters degrees, 3% doctoral or post doctoral work, and 6% unknown. Age group percentages were: 11% under 18, 29% 18 to 20, 12% 21 to 24, 10% 25 to 29, 16% 30 to 39, 10% 40 to 49, 5% 50 to 59, 2% 60 plus, and 5% unknown.

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The Selection Ratio Type Table Program is used to determine if the distribution of type of one population is significantly different from the distribution of type of another population. In the present study, a population of Canadian teachers ( $N = 99$ ) is compared to a population of American teachers ( $N = 804$ ). The null hypothesis is that the percentages of the sixteen types will be the same for any given group. In the teaching population there is a predominance of SJs which is evident in both the Canadian and American type tables.

The selection index ( $I$ ) for each cell represents the ratio of percent of type in the group in relation to a percent in the sample made of both groups. The results indicate that there is no significant difference in the distribution of the frequencies of type in any of the cells of both populations. Thus, the subjects of the present study may be considered to be representative of the population from which they were drawn.



MEMORANDUM  
DISTRIBUTION OF BASE POPULATION  
IN TYPE TABLE ORDER

|    |     |    |    |
|----|-----|----|----|
| 96 | 163 | 48 | 20 |
| 14 | 44  | 44 | 15 |
| 9  | 48  | 89 | 13 |
| 76 | 114 | 66 | 44 |

TOTAL N = 903.

MBTI TYPE TABLE  
CENTER FOR APPLICATIONS  
OF PSYCHOLOGICAL TYPE

LEGEND: % = PERCENT OF  
TOTAL CHOOSING THIS GROUP  
WHO FALL INTO THIS TYPE.  
I = SELFSELECTION INDEX.  
RATIO OF PERCENT OF TYPE  
IN GROUP TO % IN SAMPLE.

GROUP  
TABULATED:  
CANADIAN TEACHERS

SOURCE OF DATA:  
SAMPLE REPRESENTATIVENESS  
USING THE MBTI  
ELEMENTARY TEACHERS  
N = 903

N = 99

| SENSING TYPES WITH THINKING |           | INTUITIVE TYPES WITH FEELING |          | INTUITIVE TYPES WITH THINKING |          | N  | %     | I    |
|-----------------------------|-----------|------------------------------|----------|-------------------------------|----------|----|-------|------|
| I S T J                     | I S F J   | I N F J                      | I N T J  | I N T J                       | I N T J  |    |       |      |
| N = 10                      | N = 19    | N = 7                        | N = 3    | N = 3                         | N = 3    | 44 | 44.44 | 0.87 |
| % = 10.10                   | % = 19.19 | % = 7.07                     | % = 3.03 | % = 3.03                      | % = 3.03 | 55 | 55.56 | 1.13 |
| I = 0.95                    | I = 1.06  | I = 1.33                     | I = 1.37 | I = 1.37                      | I = 1.37 | 61 | 61.62 | 0.99 |
| I S T P                     | I S F P   | I N F P                      | I N T P  | I N T P                       | I N T P  | 38 | 38.38 | 1.02 |
| N = 0                       | N = 6     | N = 7                        | N = 3    | N = 3                         | N = 3    | 29 | 29.29 | 0.92 |
| % = 0.00                    | % = 6.06  | % = 7.07                     | % = 3.03 | % = 3.03                      | % = 3.03 | 70 | 70.71 | 1.04 |
| I = 0.00                    | I = 1.24  | I = 1.45                     | I = 1.82 | I = 1.82                      | I = 1.82 | 71 | 71.72 | 1.03 |
| E S T P                     | E S F P   | E N F P                      | E N T P  | E N T P                       | E N T P  | 28 | 28.28 | 0.93 |
| N = 2                       | N = 2     | N = 7                        | N = 1    | N = 1                         | N = 1    | 39 | 39.39 | 1.09 |
| % = 2.02                    | % = 2.02  | % = 7.07                     | % = 1.01 | % = 1.01                      | % = 1.01 | 16 | 16.16 | 1.25 |
| I = 2.03                    | I = 0.38  | I = 0.72                     | I = 0.70 | I = 0.70                      | I = 0.70 | 12 | 12.12 | 0.69 |
| E S T J                     | E S F J   | E N F J                      | E N T J  | E N T J                       | E N T J  | 32 | 32.32 | 0.97 |
| N = 8                       | N = 14    | N = 8                        | N = 2    | N = 2                         | N = 2    | 20 | 20.20 | 0.94 |
| % = 8.08                    | % = 14.14 | % = 8.08                     | % = 2.02 | % = 2.02                      | % = 2.02 | 41 | 41.41 | 1.01 |
| I = 0.96                    | I = 1.12  | I = 1.11                     | I = 0.41 | I = 0.41                      | I = 0.41 | 29 | 29.29 | 1.07 |
|                             |           |                              |          |                               |          | 9  | 9.09  | 0.89 |
|                             |           |                              |          |                               |          | 51 | 51.52 | 1.04 |
|                             |           |                              |          |                               |          | 10 | 10.10 | 0.79 |
|                             |           |                              |          |                               |          | 18 | 18.18 | 1.02 |
|                             |           |                              |          |                               |          | 20 | 20.20 | 1.02 |
|                             |           |                              |          |                               |          | 23 | 23.23 | 0.89 |
|                             |           |                              |          |                               |          | 6  | 6.06  | 1.07 |
|                             |           |                              |          |                               |          | 22 | 22.22 | 0.39 |
|                             |           |                              |          |                               |          | 48 | 48.48 | 1.12 |
|                             |           |                              |          |                               |          | 20 | 20.20 | 1.44 |
|                             |           |                              |          |                               |          | 18 | 18.18 | 0.77 |
|                             |           |                              |          |                               |          | 35 | 35.35 | 1.01 |
|                             |           |                              |          |                               |          | 26 | 26.26 | 0.96 |

J U D G G I N G N O N C O N T R O V E R T S P E R C E P T I V E S E X T R A V E R T S J U D G I N G

NOTE CONCERNING SYMBOLS FOLLOWING THE SELECTION RATIOS:  
 \* IMPLIES SIGNIFICANCE AT THE .05 LEVEL, I.E., CHI SQ. > 3.8;  
 % IMPLIES SIGNIFICANCE AT THE .01 LEVEL, I.E., CHI SQ. > 6.6;  
 I IMPLIES SIGNIFICANCE AT THE .001 LEVEL, I.E., CHI SQ. > 10.8.  
 (UNDERScore) INDICATES FISHER'S EXACT PROBABILITY USED INSTEAD OF CHI-SQUARE.

BASE POPULATION USED IN CALCULATING SELECTION RATIO:  
 TOTAL OF AMERICAN AND CANADIAN TEACHERS (AUGUST 1987)  
 BASE TOTAL N = 903. SAMPLE AND BASE ARE DEPENDENT.

SELECTION RATIO-TYPE TABLE PROGRAM  
 WRITTEN & DISTRIBUTED BY  
 CENTER FOR APPLICATIONS  
 OF PSYCHOLOGICAL TYPE

BOX 13807, UNIVERSITY STATION  
 GAINESVILLE, FLORIDA 32604

Appendix K, MBTI Distribution of Type  
for the Selected Sample

| SENSING TYPES  |   | INTUITIVE TYPES                                  |                                      |                              | n  | %  |      |
|--|---|--|--------------------------------------|------------------------------|----|----|------|
| with THINKING  | with FEELING  | with FEELING                                     | with THINKING                        |                              |    |    |      |
| <b>ISTJ</b><br>N= 7 <sup>3</sup><br>%= 11.7<br>++++++++<br>+++++ | <b>ISFJ</b><br>N= 7<br>%= 11.7<br>++++++++<br>+++++ | <b>INFJ</b><br>N= 3<br>%= 5.0<br>+++++           | <b>INTJ</b><br>N= 2<br>%= 3.3<br>+++ | JUDGING<br><br>INTROVERTS    | E  | 30 | 50.0 |
|  |   |  |                                      |                              | I  | 30 | 50.0 |
|  |   |  |                                      |                              | S  | 37 | 61.7 |
|  |   |  |                                      |                              | N  | 23 | 38.3 |
| <b>ISTP</b><br>N= 2<br>%= 3.3<br>+++                             | <b>ISFP</b><br>N= 5<br>%= 8.3<br>++++++++<br>++     | <b>INFP</b><br>N= 6<br>%= 10.0<br>++++++++<br>++ | <b>INTP</b><br>N= 1<br>%= 1.7<br>+   | PERCEPTIVE<br><br>INTROVERTS | T  | 20 | 33.3 |
|  |   |  |                                      |                              | F  | 40 | 66.7 |
|  |   |  |                                      |                              | J  | 40 | 66.7 |
|  |   |  |                                      |                              | P  | 20 | 33.3 |
| <b>ESTP</b><br>N= 2<br>%= 3.3<br>+++                             | <b>ESFP</b><br>N= 1<br>%= 1.7<br>++                 | <b>ENFP</b><br>N= 6<br>%= 10.0<br>++++++++<br>++ | <b>ENTP</b><br>N= 1<br>%= 1.7<br>+   | PERCEPTIVE<br><br>EXTRAVERTS | IJ | 19 | 31.7 |
|  |   |  |                                      |                              | IP | 11 | 18.3 |
|  |   |  |                                      |                              | EP | 9  | 15.0 |
|  |   |  |                                      |                              | EJ | 21 | 35.0 |
| <b>ESTJ</b><br>N= 8<br>%= 13.3<br>++++++++<br>+++++              | <b>ESFJ</b><br>N= 7<br>%= 11.7<br>++++++++<br>+++++ | <b>ENFJ</b><br>N= 5<br>%= 8.3<br>++++++++        | <b>ENTJ</b><br>N= 1<br>%= 1.7<br>++  | JUDGING<br><br>EXTRAVERTS    | ST | 17 | 28.3 |
|  |   |  |                                      |                              | SF | 20 | 33.3 |
|  |   |  |                                      |                              | NF | 20 | 33.3 |
|  |   |  |                                      |                              | NT | 3  | 5.0  |
|  |   |  |                                      |                              | SJ | 29 | 48.3 |
|  |   |  |                                      |                              | SP | 8  | 13.3 |
|  |   |  |                                      |                              | NP | 12 | 20.0 |
|  |   |  |                                      |                              | NJ | 11 | 18.3 |
|  |   |  |                                      |                              | TJ | 18 | 30.0 |
|  |   |  |                                      |                              | TP | 2  | 3.3  |
|  |   |  |                                      |                              | FP | 18 | 30.0 |
|  |   |  |                                      |                              | FJ | 22 | 36.7 |
|  |   |  |                                      |                              | IN | 11 | 18.3 |
|  |   |  |                                      |                              | EN | 12 | 20.0 |
|  |   |  |                                      |                              | IS | 19 | 31.7 |
|  |   |  |                                      |                              | ES | 18 | 30.0 |
|  |   |  |                                      |                              | ET | 11 | 18.3 |
|  |   |  |                                      |                              | EF | 19 | 31.7 |
|  |   |  |                                      |                              | IF | 21 | 35.0 |
|  |   |  |                                      |                              | IT | 9  | 15.0 |

NOTES:<sup>5</sup>

+ = 1% of sample

Female  $\bar{n}$  = 56

Male  $\bar{n}$  = 4

|            |    |      |
|------------|----|------|
| dominant S | 17 | 28.3 |
| dominant N | 11 | 18.3 |
| dominant T | 9  | 15.0 |
| dominant F | 23 | 38.3 |

|        |       |   |
|--------|-------|---|
| Column | 1-2   | identification number                                     |
|        | 4-5   | level of use  |
|        | 7     | hands-on activity (kinds of materials)                    |
|        | 9     | hands-on activity (student/teacher handling of materials) |
|        | 11    | child-centred approach (kinds of student choice)          |
|        | 13    | child-centred approach (type of planning)                 |
|        | 15    | child-centred approach (classroom setup)                  |
|        | 17    | integration (kinds of integration)                        |
|        | 19    | integration (kinds of scheduling)                         |
|        | 21    | integration (use of activity centres)                     |
|        | 23-26 | sensing thinking activity choices                         |
|        | 28-31 | sensing feeling activity choices                          |
|        | 33-36 | intuitive thinking activity choices                       |
|        | 38-41 | intuitive feeling activity choices                        |
|        | 43    | years of teaching experience                              |
|        | 46    | E or I  |
|        | 47    | S or N  |
|        | 48    | T or F  |
|        | 49    | J or P  |
|        | 51    | E or I strength of preference <sup>a</sup>                |
|        | 52    | S or N strength of preference                             |
|        | 53    | T or F strength of preference                             |
|        | 54    | J or P strength of preference                             |
|        | 56    | sex   |
|        | 59-60 | years of program experience                               |
|        | 63-72 | MBTI scores   |

<sup>a</sup>1 = score of 1-9; 2 = score of 11-19; 3 = score of 21+

|    |    |   |   |   |   |   |   |   |   |      |      |      |      |    |      |      |   |    |    |    |    |    |
|----|----|---|---|---|---|---|---|---|---|------|------|------|------|----|------|------|---|----|----|----|----|----|
| 01 | 06 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 0221 | 1220 | 1103 | 3011 | 20 | INFJ | 1331 | F | 02 | 07 | 33 | 27 | 07 |
| 02 | 03 | 2 | 3 | 2 | 4 | 3 | 4 | 3 | 4 | 2300 | 2120 | 1112 | 0023 | 17 | ISFP | 1332 | F | 02 | 07 | 43 | 29 | 11 |
| 03 | 07 | 2 | 1 | 2 | 3 | 1 | 3 | 2 | 2 | 2030 | 1211 | 0203 | 2111 | 11 | ENFP | 2333 | M | 01 | 13 | 29 | 25 | 25 |
| 04 | 07 | 1 | 1 | 2 | 2 | 1 | 4 | 3 | 3 | 0212 | 0230 | 3002 | 2111 | 21 | ISTJ | 3323 | F | 02 | 37 | 25 | 11 | 45 |
| 05 | 08 | 1 | 1 | 2 | 3 | 3 | 4 | 2 | 2 | 3101 | 0050 | 2300 | 0104 | 19 | ISFP | 2223 | F | 02 | 11 | 15 | 11 | 29 |
| 06 | 07 | 2 | 2 | 2 | 4 | 2 | 4 | 3 | 2 | 2210 | 0041 | 3101 | 0203 | 33 | ISTJ | 3313 | F | 02 | 25 | 37 | 01 | 35 |
| 07 | 07 | 2 | 1 | 2 | 4 | 2 | 4 | 3 | 2 | 1130 | 2120 | 1004 | 1301 | 09 | ESTJ | 1233 | F | 01 | 01 | 11 | 25 | 45 |
| 08 | 07 | 1 | 1 | 2 | 4 | 2 | 3 | 3 | 1 | 2111 | 2003 | 1310 | 0131 | 17 | ESTJ | 3313 | F | 01 | 37 | 35 | 03 | 31 |
| 09 | 08 | 1 | 1 | 2 | 4 | 1 | 1 | 3 | 1 | 1211 | 2210 | 1121 | 1013 | 15 | ENFJ | 3332 | F | 01 | 29 | 39 | 35 | 13 |
| 10 | 03 | 1 | 2 | 4 | 4 | 3 | 4 | 3 | 2 | 2120 | 1220 | 2111 | 0104 | 23 | ESTJ | 1233 | F | 02 | 09 | 11 | 29 | 27 |
| 11 | 03 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 2 | 2030 | 1400 | 0113 | 2012 | 20 | ESTJ | 3233 | F | 02 | 41 | 13 | 35 | 51 |
| 12 | 03 | 4 | 2 | 3 | 4 | 3 | 4 | 3 | 4 | 1400 | 1022 | 1121 | 2012 | 16 | INFP | 3333 | M | 02 | 29 | 27 | 35 | 53 |
| 13 | 08 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1310 | 0140 | 0005 | 4100 | 05 | ENFP | 3333 | F | 02 | 47 | 43 | 31 | 55 |
| 14 | 03 | 1 | 1 | 2 | 2 | 1 | 4 | 3 | 2 | 1220 | 1130 | 1103 | 2102 | 22 | ISFP | 3231 | F | 02 | 33 | 15 | 27 | 01 |
| 15 | 08 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0104 | 2030 | 1301 | 2120 | 14 | INFJ | 2333 | F | 02 | 13 | 21 | 27 | 41 |
| 16 | 05 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0212 | 1130 | 0212 | 4001 | 17 | INFP | 1331 | F | 02 | 05 | 33 | 35 | 05 |
| 17 | 08 | 1 | 1 | 2 | 1 | 1 | 3 | 2 | 1 | 1202 | 0050 | 0302 | 4001 | 12 | ENFP | 3332 | F | 02 | 41 | 25 | 37 | 13 |
| 18 | 08 | 1 | 1 | 2 | 1 | 1 | 3 | 3 | 2 | 0032 | 1211 | 3200 | 1112 | 02 | ISFP | 2223 | F | 02 | 11 | 13 | 19 | 33 |
| 19 | 06 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1202 | 1121 | 0032 | 3200 | 09 | INTJ | 2231 | F | 02 | 13 | 11 | 27 | 09 |
| 20 | 07 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 1 | 1220 | 1130 | 0005 | 3200 | 17 | ESFJ | 1222 | F | 02 | 03 | 11 | 11 | 15 |
| 21 | 08 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 4010 | 0032 | 0311 | 1202 | 14 | ISFJ | 3323 | F | 01 | 37 | 23 | 11 | 37 |
| 22 | 03 | 1 | 2 | 2 | 4 | 3 | 3 | 3 | 3 | 0311 | 1031 | 1202 | 3011 | 21 | ISTJ | 2323 | F | 01 | 17 | 43 | 13 | 47 |
| 23 | 03 | 2 | 1 | 3 | 3 | 1 | 3 | 3 | 2 | 1400 | 2021 | 1103 | 1031 | 21 | ISFJ | 3333 | F | 01 | 35 | 65 | 29 | 51 |
| 24 | 07 | 1 | 1 | 4 | 4 | 3 | 3 | 3 | 3 | 0320 | 0122 | 1103 | 4010 | 02 | ENFP | 3333 | F | 01 | 39 | 39 | 25 | 47 |
| 25 | 06 | 1 | 1 | 2 | 2 | 3 | 1 | 2 | 1 | 2201 | 2120 | 0014 | 1220 | 10 | ISFJ | 3331 | F | 02 | 29 | 25 | 23 | 07 |
| 26 | 06 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0032 | 3101 | 0311 | 2111 | 03 | ENFJ | 3332 | F | 02 | 25 | 35 | 21 | 19 |
| 27 | 07 | 1 | 1 | 4 | 4 | 2 | 2 | 2 | 1 | 2210 | 1220 | 0005 | 2120 | 03 | ENFJ | 1331 | F | 01 | 01 | 41 | 21 | 07 |
| 28 | 07 | 2 | 1 | 3 | 4 | 1 | 4 | 3 | 2 | 4100 | 0131 | 0104 | 1220 | 19 | ISTJ | 3333 | F | 02 | 25 | 47 | 33 | 47 |
| 29 | 07 | 1 | 1 | 2 | 4 | 1 | 3 | 3 | 2 | 2111 | 0311 | 1112 | 2021 | 17 | ESTJ | 2212 | F | 02 | 11 | 13 | 05 | 19 |
| 30 | 07 | 1 | 1 | 2 | 4 | 1 | 3 | 3 | 2 | 2210 | 1130 | 0005 | 2210 | 14 | ISTJ | 1333 | F | 02 | 07 | 27 | 31 | 27 |
| 31 | 03 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 1 | 1220 | 0122 | 1112 | 3101 | 01 | INFP | 1333 | F | 01 | 09 | 27 | 39 | 27 |
| 32 | 03 | 1 | 2 | 2 | 4 | 3 | 4 | 3 | 3 | 0311 | 0221 | 1022 | 4001 | 13 | ESFJ | 3333 | F | 02 | 27 | 21 | 27 | 25 |
| 33 | 03 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0212 | 1130 | 2012 | 2201 | 06 | ENTJ | 1333 | F | 02 | 03 | 33 | 25 | 27 |
| 34 | 08 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 0401 | 0050 | 1103 | 4001 | 25 | ISFP | 3323 | F | 02 | 21 | 43 | 17 | 23 |
| 35 | 03 | 1 | 1 | 3 | 4 | 1 | 3 | 3 | 2 | 0401 | 0032 | 4010 | 1112 | 22 | ESTJ | 3233 | F | 02 | 39 | 15 | 23 | 41 |
| 36 | 03 | 2 | 2 | 4 | 2 | 1 | 3 | 3 | 3 | 1220 | 2030 | 1004 | 1301 | 14 | ISFJ | 1233 | F | 02 | 09 | 11 | 37 | 53 |
| 37 | 08 | 1 | 1 | 2 | 2 | 1 | 3 | 3 | 1 | 0023 | 0311 | 2201 | 3020 | 09 | INFP | 2231 | F | 02 | 17 | 11 | 31 | 03 |
| 38 | 07 | 2 | 1 | 2 | 4 | 2 | 3 | 3 | 3 | 0122 | 0230 | 2201 | 3002 | 12 | ESFP | 3331 | F | 02 | 23 | 29 | 25 | 01 |
| 39 | 03 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 5000 | 0221 | 0131 | 0203 | 09 | ESFJ | 2333 | F | 02 | 17 | 29 | 25 | 31 |
| 40 | 07 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 1 | 2120 | 1121 | 0203 | 2111 | 26 | ESTJ | 1211 | F | 02 | 07 | 19 | 03 | 05 |
| 41 | 05 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0041 | 3110 | 0203 | 2201 | 12 | INFJ | 1231 | F | 02 | 01 | 19 | 41 | 09 |
| 42 | 05 | 1 | 1 | 2 | 4 | 1 | 2 | 3 | 1 | 2210 | 2021 | 0113 | 1211 | 10 | ESFJ | 3333 | F | 02 | 35 | 37 | 31 | 47 |
| 43 | 03 | 2 | 1 | 2 | 4 | 1 | 3 | 3 | 2 | 0212 | 1112 | 3101 | 1130 | 14 | ESFJ | 1333 | F | 02 | 09 | 49 | 21 | 45 |
| 44 | 07 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 0113 | 1121 | 0311 | 4010 | 01 | ENFP | 2333 | F | 01 | 15 | 39 | 37 | 37 |
| 45 | 07 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 0122 | 2201 | 0131 | 3101 | 02 | ESTP | 1133 | F | 02 | 03 | 07 | 23 | 21 |
| 46 | 08 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1301 | 1121 | 0113 | 3020 | 27 | ISTJ | 3323 | F | 02 | 39 | 27 | 15 | 33 |
| 47 | 05 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0014 | 2210 | 1121 | 2210 | 28 | INFP | 2333 | F | 02 | 11 | 21 | 41 | 33 |
| 48 | 03 | 1 | 2 | 2 | 4 | 3 | 3 | 3 | 2 | 0140 | 2201 | 0014 | 3200 | 06 | INFP | 1223 | F | 02 | 01 | 13 | 19 | 25 |
| 49 | 05 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 4 | 0401 | 3110 | 0023 | 2021 | 17 | ISFJ | 3333 | F | 02 | 47 | 43 | 33 | 39 |
| 50 | 03 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 0122 | 2210 | 0112 | 3011 | 15 | ENFP | 1322 | M | 01 | 07 | 27 | 17 | 19 |
| 51 | 03 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 1 | 4010 | 1130 | 0014 | 0401 | 10 | ISFJ | 3333 | F | 02 | 27 | 35 | 21 | 23 |
| 52 | 03 | 1 | 2 | 3 | 4 | 3 | 3 | 3 | 2 | 2111 | 1130 | 1301 | 1013 | 10 | ISFJ | 3333 | F | 01 | 33 | 41 | 39 | 29 |
| 53 | 03 | 1 | 1 | 4 | 4 | 1 | 3 | 2 | 3 | 2201 | 1121 | 1202 | 1031 | 16 | ESTJ | 2211 | F | 02 | 13 | 13 | 07 | 07 |
| 54 | 08 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2300 | 0032 | 1112 | 2111 | 05 | INTJ | 1133 | M | 01 | 07 | 09 | 53 | 51 |
| 55 | 03 | 2 | 1 | 2 | 3 | 3 | 3 | 2 | 1 | 2012 | 0410 | 2021 | 1112 | 10 | ESFJ | 1223 | F | 02 | 01 | 11 | 13 | 35 |
| 56 | 03 | 2 | 2 | 2 | 4 | 1 | 3 | 3 | 2 | 1310 | 1121 | 1112 | 2012 | 12 | ESTP | 3211 | F | 01 | 33 | 17 | 01 | 09 |
| 57 | 03 | 2 | 2 | 4 | 4 | 1 | 3 | 2 | 3 | 2120 | 1310 | 0014 | 2111 | 20 | ESFJ | 3313 | F | 02 | 29 | 33 | 07 | 35 |
| 58 | 08 | 2 | 2 | 4 | 2 | 3 | 3 | 3 | 2 | 1121 | 3020 | 0014 | 1400 | 27 | ENFJ | 3323 | F | 02 | 33 | 31 | 11 | 29 |
| 59 | 07 | 1 | 1 | 2 | 2 | 1 | 3 | 3 | 2 | 3110 | 1031 | 1103 | 0311 | 10 | ISTJ | 3333 | F | 02 | 53 | 55 | 49 | 55 |
| 60 | 03 | 2 | 1 | 2 | 4 | 1 | 3 | 3 | 1 | 2201 | 2120 | 1103 | 0131 | 17 | ENFJ | 3331 | F | 02 | 39 | 31 | 21 | 01 |

Appendix M MBTI Preference Strength on the 207  
SN and TF Functions of the Selected Sample

A low preference score between 1 and 9 is designated by a 1; a moderate preference score between 11 and 19 is designated by a 2; and a strong preference score over 21 is designated by a 3. As can be seen from the results below, the majority of the subjects display a moderate or strong preference on the SN (first number) and the TF (second number) functions.

|    |    |
|----|----|
| 33 | 23 |
| 33 | 23 |
| 33 | 33 |
| 32 | 33 |
| 22 | 21 |
| 31 | 23 |
| 23 | 33 |
| 31 | 33 |
| 33 | 33 |
| 23 | 13 |
| 23 | 32 |
| 33 | 33 |
| 33 | 22 |
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| 33 | 32 |
| 33 | 33 |
| 33 | 33 |
| 22 | 21 |
| 23 | 13 |
| 22 | 22 |
| 32 | 21 |
| 32 | 31 |
| 33 | 32 |
| 33 | 33 |
| 33 | 33 |
| 33 |    |
| 33 |    |
| 33 |    |
| 21 |    |
| 33 |    |
| 33 |    |
| 33 |    |
| 33 |    |
| 32 |    |
| 23 |    |

Environmental Studies Program (Gr. 1)

|  | UNIT  | KNOWLEDGE   | SKILLS   | ATTITUDE  |
|--|---|---|--|---|
| B<br>E<br>G<br>I<br>N<br>N<br>I<br>N<br>G<br>S           | <u>CORE</u><br>BREAKING OUT<br>Animal Beginnings      | Life, Change,<br>Spatial Interaction                              | Classifying,<br>Measuring, Predicting,<br>Seriating                | Openmindedness,<br>Curiosity,<br>Sensitivity,<br>Compassion |
|  | SPROUTING<br>Plant Beginnings                         | Life, Space   | Classifying,<br>Observing, Communicating<br>Information            | Curiosity,<br>Openmindedness                                |
|  | WATCH ME GROW<br>Human Beginnings                     | Life, Matter,<br>Globalism  | Seriating, Measuring,<br>Recording                                 | Openmindedness,<br>Curiosity,<br>Sensitivity                |
|  | <u>OPTIONAL</u><br>DANDELION                          | Life  | Observing, Recording   | Curiosity<br>Openmindedness                                 |
|  | BUTTERFLY<br>LEAVES                                   | Life<br>Life, Space, Matter                                       | Observing, Recording<br>Classifying,<br>Seriating                  | Awareness   |
|  | LOOKING AT THE SKY<br>(Silver Burdett, Gr.1)          | Matter, Time  | Observing, Classifying<br>Seriating                                | Curiosity,<br>Accuracy                                      |
| N<br>E<br>E<br>D<br>S                                    | <u>CORE</u><br>STAYING ALIVE<br>Animal Needs          | Life, Globalism   | Measuring, Observing,<br>Inquiring                                 | Sensitivity,<br>Compassion,<br>Curiosity                    |
|  | TALK TO YOUR PLANTS<br>Plant Needs                    | Life, Space, Change   | Observing, Seriating,<br>Recording                                 | Curiosity,<br>Sensitivity                                   |
|  | UNDER COVER<br>Human Needs                            | Life, Culture,<br>Resource Management                             | Observing, Recording,<br>Listening                                 | Sensitivity,<br>Compassion,<br>Curiosity                    |
|  | <u>OPTIONAL</u><br>EARTH AND WATER                    | Matter, Time,<br>Resource Management,<br>Globe & Map Skills       | Classifying,<br>Observing,<br>Interpreting                         | Sensitivity to<br>Environment                               |
|  | DINOSAURS   | Life, Change  | Observing, Comparing,<br>Communicating                             | Curiosity,<br>Appreciation                                  |
|  | CARING FOR YOURSELF<br>(Silver Burdett, Gr.1)         | Life  | Communicating,<br>Interpreting                                     | Sensitivity,<br>Compassion,<br>Awareness                    |
| S<br>U<br>R<br>R<br>O<br>U<br>N<br>D<br>I<br>N<br>G<br>S | <u>CORE</u><br>WATER ACTIVITIES                       | Matter, Space   | Observing,<br>Manipulating,<br>Measuring                           | Openmindedness,<br>Curiosity,<br>Awareness                  |
|  | SAND ACTIVITIES                                       |   |  |   |
|  | RIGHT AROUND US<br>Home and School<br>Map & Globe     | Resource, Management,<br>Globalism, Civics,<br>Globe & Map Skills | Classifying,<br>Observing, Recording,<br>Hypothesizing             | Accuracy,<br>Curiosity,<br>Awareness                        |
|  | <u>OPTIONAL</u><br>COLOUR, SHAPES AND<br>SIZES        | Energy, Space   | Observing, Classifying,<br>Identifying,<br>Manipulating, Comparing | Curiosity,<br>Appreciation,<br>Sensitivity                  |
|  | LEARNING ABOUT OUR<br>WORLD<br>(Silver Burdett, Gr.1) | Life, Space   | Observing, Predicting,<br>Seriating                                | Curiosity,<br>Appreciation                                  |

Environmental Studies Program (Gr. 2)

|   | UNIT  | KNOWLEDGE  | SKILLS   | ATTITUDE   |
|---|---|--|--|--|
| C<br>H<br>A<br>N<br>G<br>E  | <u>CORE</u><br>BLOOMING<br>Parts of Plant<br>Elemental Growth<br>Needs                            | Life   | Observing,<br>Hypothesizing  | Accuracy,<br>Persistence                                   |
|   | TAKE CARE<br>Keeping Safe and<br>Sound  | Life   | Predicting, Classifying<br>Hypothesizing,<br>Interpreting          | Sensitivity  |
|   | TRANSPORTATION  | Demography, Change,<br>Civics                                | Classifying,<br>Interpreting                                       | Curiosity,<br>Sensitivity                                  |
|   | <u>OPTIONAL</u><br>STATES OF MATTER   | Energy   | Predicting   | Accuracy   |
|   | LIFE CYCLE<br>WIND AND WEATHER  | Time<br>Matter   | Observing, Predicting<br>Measuring, Classifying                    | Curiosity<br>Curiosity                                     |
| E<br>X<br>P<br>L<br>O<br>R<br>I<br>N<br>G                               | <u>CORE</u><br>HELLO, SUN!  | Space, Energy, Life  | Observing  | Curiosity<br>Sensitivity                                   |
|   | FIVE ALIVE<br>Our Senses  | Matter   | Measuring, Classifying   | Curiosity  |
|   | ALL AROUND US<br>Community<br>Homes and Buildings<br>Vacant Lots                                  | Spatial Interaction<br>Culture                               | Observing, Inquiring,<br>Recording                                 | Sensitivity  |
|   | <u>OPTIONAL</u><br>FLIGHT   | Space, Time  | Measuring, Predicting  | Accuracy   |
|   | BUOYANCY<br>RAINBOWS<br>DON'T LOOK NOW!<br>(Our Changing<br>Community)                            | Matter<br>Energy<br>Demography, Change<br>Civics, Map Skills | Recording<br>Controlling Variables<br>Classifying,<br>Interpreting | Persistence<br>Curiosity<br>Curiosity<br>Sensitivity       |
| W<br>O<br>R<br>K<br>I<br>N<br>G<br>T<br>O<br>G<br>E<br>T<br>H<br>E<br>R | <u>CORE</u><br>HAPPY HABITATS<br>Animals and Their<br>Environments<br>Pollution -<br>Conservation | Spatial Interaction  | Interpreting,<br>Measuring, Observing                              | Sensitivity  |
|   | GIVE ME A HAND<br>Community Workers   | Regionalism,<br>Resource Management                          | Inquiring  | Sensitivity  |
|   | <u>OPTIONAL</u><br>SIMPLE MACHINES  | Energy   | Measuring, Recording   | Accuracy   |
|   | NUTRITION<br>OUR EARTH'S AIR<br>& WATER<br>(Silver Burdett, Gr. 2)                                | Matter<br>Life, Matter                                       | Classifying<br>Inferring, Communicating                            | Objectivity<br>Sensitivity<br>to Others and<br>Environment |

Environmental Studies Program (Gr. 3)

|  | UNIT  | KNOWLEDGE   | SKILLS  | ATTITUDE  |
|--|---|---|---|---|
| E<br>N<br>V<br>I<br>R<br>O<br>N<br>M<br>E<br>N<br>T<br>S   | <u>CORE</u><br>SURVIVING<br>Plant and Animal<br>Adaptation  | Change, Life  | Classifying, Observing,<br>Controlling Variables  | Objectivity<br>Sensitivity to<br>Environment  |
|  | PEOPLE CALL IT HOME<br>Human Adaptation:<br>A Canadian Community  | Culture, Demography,<br>Civics                            | Interpreting<br>Information,<br>Researching   | Openmindedness,<br>Sensitivity to<br>Others   |
|  | THE MOST IMPORTANT<br>PERSON<br>Individuality,<br>Privacy, Uniqueness,<br>Stress, Leisure,<br>Lifestyle | Life  | Observing   | Sensitivity   |
|  | <u>OPTIONAL</u><br>OTTAWA   | Demography, Civics  | Researching,<br>Interpreting<br>Information   | Curiosity,<br>Sensitivity to<br>Environment   |
| S<br>P<br>A<br>C<br>E<br>S<br>H<br>I<br>P<br>E<br>A<br>R<br>T<br>H<br>R<br>O<br>C<br>K<br>S<br>A<br>N<br>D<br>M<br>I<br>N<br>E<br>R<br>A<br>L<br>S | SPACESHIP, EARTH  | Time  | Observing, Measuring  | Accuracy,<br>Objectivity  |
|  | ROCKS AND MINERALS  | Matter  | Classifying,<br>Observing   | Sensitivity to<br>Environment   |
|  | <u>CORE</u><br>LET'S GO<br>Trip Across Canada   | Regionalism, Space  | Measuring,<br>Interpreting Maps<br>& Globes   | Accuracy,<br>Curiosity,<br>Sensitivity to<br>Others and<br>Environment,<br>Openmindedness |
| M<br>O<br>V<br>I<br>N<br>G<br>O<br>U<br>T  | PUSH AND PULL<br>Forces, Motion   | Energy, Time  | Measuring, Observing,<br>Predicting,<br>Hypothesizing,<br>Controlling Variables         | Accuracy,<br>Objectivity,<br>Curiosity  |
|  | <u>OPTIONAL</u><br>SHADOWS  | Time  | Observing   | Accuracy,<br>Objectivity,<br>Persistence  |
|  | PIONEER DAYS  | Change, Demography  | Serialing,<br>Researching   | Curiosity,<br>Sensitivity to<br>Others  |
|  | MOVEMENT:<br>Plant<br>Animal<br>Human   | Life, Space   | Measuring, Observing,<br>Classifying  | Accuracy,<br>Objectivity  |
| L<br>I<br>N<br>K<br>I<br>N<br>G  | <u>CORE</u><br>A DAY IN THE LIFE<br>Contributions<br>Communications<br>Food<br>Nutrition                | Globalism, Spatial<br>Interaction,<br>Resource Management | Classifying, Serialing,<br>Interpreting Information<br>and Maps & Globes<br>Researching | Curiosity,<br>Sensitivity to<br>Environment   |
|  | MOTHER NATURE'S<br>RECIPE.<br>Plant and Animal<br>Interdependence                                       | Energy, Life,<br>Resource Management                      | Serialing, Organizing<br>Classifying  | Sensitivity in<br>dealing with<br>Environment   |
|  | MINI-PARTS<br>Molecules   | Matter  | Classifying, Observing,<br>Controlling Variables  | Accuracy,<br>Objectivity,<br>Curiosity  |
|  | <u>OPTIONAL</u><br>COMPUTERS  | Change, Spatial-<br>Interaction                           | Inquiring   | Openmindedness,<br>Curiosity,<br>Persistence  |
|  | CELLS   | Life  | Observing   | Curiosity   |

# DANDELIONS



Carleton Roman Catholic School Board  
Used with permission.

Dear Parents:

The grade one class is about to begin a unit on Dandelions. This common plant found everywhere can be used as a starting point to develop an understanding of ecology (the study of how plants and animals relate to each other and the world around them). This unit focuses on this quick-growing plant and allows them to see the whole life cycle in a short time span.

Special vocabulary will be developed:

floret      dispersal      flower head      milky fluid      pollen  
parachute      weed      tap root

The children will be observing, listening, measuring and experimenting with dandelions in the out-of-doors and in the classroom.

Sincerely,

TITLE: DANDELIONS

TIME FRAME: Spring

RATIONALE-WHY?

Dandelions are available everywhere. Children pick bouquets for teacher, mom and dad. They blow on the seed puffs. This unit focuses on the changes in the quick-growing plant and allows them to see the whole life cycle in a short time span.

MAJOR CONCEPTS-WHAT?

1. Dandelions grow almost everywhere.
2. Dandelions grow quickly.
3. Dandelions need sun, air, water, soil, in order to grow.
4. The dandelion is called a weed.
5. A weed is a plant that grows where people want other plants to grow.
6. Dandelion heads open and close.
7. Dandelions wilt when picked.

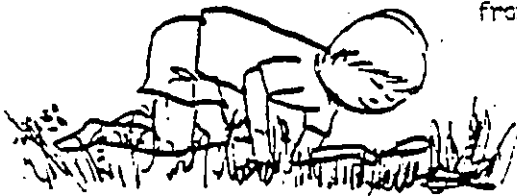
ACTIVITIES-HOW?

Those activities marked with E may be used for evaluation of the unit. Activities marked with an \* have resources.

OBSERVING

1. Contest  
Watch for the first dandelion. Reward - card from teacher

SF



|   |
|---|
| <p>John Brown found Spring's first dandelion on April 1, 1985.<br/>Mrs. Smith</p> |
|---|

RECORDING

2. Chart  
Places We Found Dandelions

ST

EXPERIMENTING

3. Find a dandelion plant growing outdoors. Insert a popsicle stick with your name on it, in the ground beside the dandelion. Each day mark the growth with a marker. Compare to see which dandelions are growing faster.

ST

OBSERVING

4. Examine dandelion plants. The flower is a cluster of flowers called a floret. Each flower produces a seed. Stem has a sticky substance and hollow. Roots are hard to pull up. Break a root and examine the juice!

ST

OBSERVING

5. Watch to see when dandelion heads are open and closed. Record results.

ST

SERVIATING

6. Pull 10 dandelions - Lay out on paper - are all stems the same length? Why?

ST

OBSERVING  
PREDICTING

7. Find a dandelion plant that is big. Look under the leaves to see how many plants are growing under the dandelion leaves. Discuss how the dandelion plant affects other plants. What will happen to these plants?

NT

Note. For a description of the classification of the activities see Appendix O.

Dandelions

COMPARING

OBSERVING

OBSERVING

OBSERVING



PREDICTING  
OBSERVING

INTEGRATING

INTEGRATING

8. Compare a dandelion seed to a parachute. NT  
Puff on dandelion seed heads and observe their travel. ST
9. Put some dandelion seeds in water. Do they float? How long will they stay afloat. ST
10. Have each child plant a dandelion seed in a styrofoam cup. Record - How many dandelion seeds that are planted will actually grow? ST
11. Making dandelion chains. Pull several dandelions. Leave long stems. One end of stem is tiny, the other is large. Tuck tiny end into large end to form circle. ST  
Loop next stem through to form a chain.
12. Select 5 dandelion plants. Have children trample on them. Leave the plant for a few days. Mark so you will recognize the plants. Predict what will happen. Observe again to see what happened to plant. NT  
ST
13. Compose a class poem about Dandelions. NF  
e.g.,  
Dandelions are yellow  
Dandelions are like gold-buttons  
Dandelions are fluffy  
Dandelions are everywhere  
Dandelions are .....
14. Read some dandelion poems. (Childcraft p.120, The Green Kingdom) SF
15. Have a botanist parent volunteer or someone who knows how to prepare dandelions, make a dandelion salad. SF  
- The young inner tender leaves can be gathered in the spring, thoroughly cleaned, blanched and used raw as salad. (Care would have to be taken in picking from an area where pesticide has not been used.)  
  
Recipe: 1 kg dandelion greens  
12 slices of bacon  
2 cloves garlic  
125 ml red wine vinegar  
1 egg beaten  
salt and pepper  
  
(taken from The Dandelion - Stecher - Holt, Rinehart)

Dandelions

RECORDING

16. Make a chart - Uses of Dandelions

salads - leaves

coffee - root

dye for fabric - roots make a reddish violet

ST

INTEGRATING

17. Read the story, Dandelion, by Don Freeman, Young Readers Press.

SF

SERIATING

18. Sequence pictures to show stages of growth.

ST

MEASUREMENT

19. Dig up dandelion roots. Who can find the longest root.

ST

INTEGRATION

20. If you could make 3 wishes on a dandelion, what would they be?

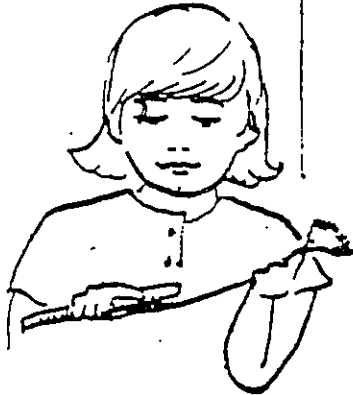
NF

OBSERVATION

21. Half fill a jar with water. Add a few drops of red food colouring. Put a dandelion root into the red ink. Leave overnight. Remove root and wash away the red ink.

ST

Slice root carefully lengthwise. Observe tubes and see how water travels through roots.

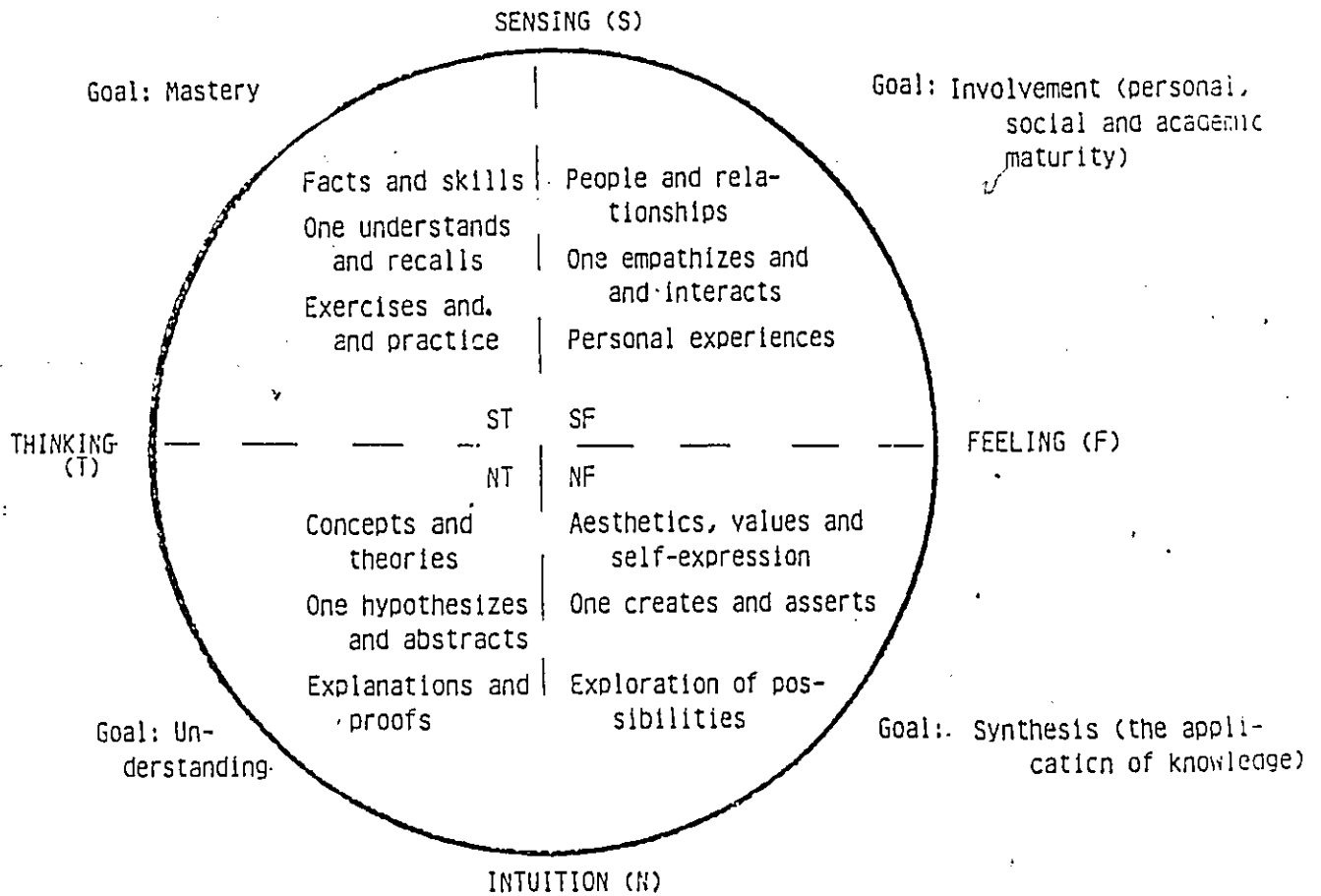


UNIT PLANNING RECORD SHEET

| DANDELION  |   |
|--|---|
| FILMS  | SONGS                                       |
| 10-1165 Spring is For Flowers                    | 784.6<br>PAN Lucille Panabaker's Song Book. |
| 10-1153 Learning About Flowers                   | p.18 Dandelion                              |
| 10-1863 The Flowers                              |   |
|  |   |
| BOOKS  |   |
| Compton's Precyclopedia, Vol. 4, p.20-21         |   |
| Dandelions                                       |   |
| 583<br>HOG The Life Cycle of the Dandelion       |   |
| (Raintree)                                       |   |
| Stecher - The Dandelion (Holt Rinehart)          |   |
| Young Children's Encycloepedia, Vol. 6, p.80-85  |   |
| - Wild Flowers                                   |   |
| Vol. 4, p.20-21 Dandelions                       |   |
|  |   |
| POEMS (included in unit)                         |   |
| Dandelions                                       |   |
| Dandelion 0 Little Soldier                       |   |
| Dandelion - There Was a Pretty                   |   |
| Dandelion  |   |
|  |   |
| INTEGRATION                                      |   |
| Journeys - Knock at My Door, p.54 Growing Things |   |
|  |   |
| MATERIALS  |   |
| Magnifying glasses                               |   |
| Styrofoam Meat Trays                             |   |
|  |   |

Appendix O A Model for Classifying Teaching 217  
 Activities According to Jungian Functions

T.L.C. Content Wheel



Note. From J. R. Hanson, Personal communication, August 29, 1986.

Appendix P    Classification of the Activities    218  
in the Primary Environmental Studies Program

| Grade 1 Units         | Total | ST | SF | NT | NF |
|-----------------------|-------|----|----|----|----|
| Breaking Out          | 24    | 11 | 1  | 6  | 6  |
| Sprouting             | 38    | 23 | 5  | 4  | 6  |
| Watch Me Grow         | 34    | 9  | 10 | 3  | 12 |
| Dandelions            | 23    | 14 | 4  | 3  | 2  |
| Butterfly             | 15    | 9  | 1  | 0  | 5  |
| Leaves                | 21    | 10 | 4  | 1  | 6  |
|                       |       |    |    |    |    |
| Staying Alive         | 32    | 16 | 5  | 4  | 7  |
| Talk to Your Plants   | 30    | 15 | 3  | 7  | 5  |
| Under Cover           | 36    | 14 | 13 | 4  | 5  |
| Earth and Water       | 30    | 18 | 0  | 10 | 2  |
| Dinosaurs             | 24    | 10 | 4  | 5  | 5  |
|                       |       |    |    |    |    |
| Water Activities      | 21    | 9  | 4  | 3  | 5  |
| Sand Activities       | 16    | 14 | 1  | 0  | 1  |
| Right Around Us       | 62    | 32 | 6  | 10 | 14 |
| Colour, Shape & Sizes | 34    | 23 | 5  | 0  | 6  |

Summary: 51.6% of the activities are ST  
15.0% of the activities are SF  
13.6% of the activities are NT  
19.8% of the activities are NF

Appendix P    Classification of the Activities    219  
 in the Primary Environmental Studies Program

| Grade 2 Units    | Total | ST | SF | NT | NF |
|------------------|-------|----|----|----|----|
| Blooming         | 17    | 14 | 1  | 0  | 2  |
| Take Care        | 34    | 13 | 10 | 0  | 11 |
| Transportation   | 24    | 12 | 2  | 1  | 9  |
| States of Matter | 31    | 15 | 0  | 15 | 1  |
| Wind and Weather | 39    | 19 | 4  | 7  | 9  |
|                  |       |    |    |    |    |
| Hello, Sun       | 19    | 14 | 1  | 4  | 0  |
| Five Alive       | 33    | 18 | 4  | 3  | 8  |
| All Around Us    | 27    | 14 | 5  | 1  | 7  |
| Flight           | 21    | 12 | 1  | 3  | 5  |
| Buoyancy         | 15    | 5  | 1  | 8  | 1  |
| Rainbows         | 27    | 13 | 4  | 1  | 9  |
| Don't Look Now   | 25    | 11 | 6  | 3  | 5  |
|                  |       |    |    |    |    |
| Happy Habitats   | 36    | 29 | 2  | 0  | 5  |
| Give Me a Hand   | 36    | 18 | 9  | 2  | 7  |
| Simple Machines  | 11    | 8  | 1  | 2  | 0  |
| Nutrition        | 18    | 8  | 5  | 0  | 5  |

Summary: 54.6% of the activities are ST  
 15.7% of the activities are SF  
 9.3% of the activities are NT  
 20.4% of the activities are NF

Appendix P    Classification of the Activities    220  
in the Primary Environmental Studies Program

| Grade 3 Units             | Total | ST | SF | NT | NF |
|---------------------------|-------|----|----|----|----|
| Surviving                 | 40    | 22 | 5  | 7  | 6  |
| People Call it Home       | 25    | 8  | 4  | 5  | 8  |
| The Most Important Person | 28    | 3  | 22 | 1  | 2  |
| Ottawa                    | 44    | 17 | 9  | 1  | 17 |
| Spaceship, Earth          | 27    | 23 | 2  | 0  | 2  |
| Rocks and Minerals        | 21    | 13 | 3  | 0  | 5  |
| Let's Go                  | 44    | 27 | 6  | 8  | 3  |
| Push and Pull             | 29    | 21 | 3  | 3  | 2  |
| Shadows                   | 10    | 7  | 1  | 1  | 1  |
| Pioneer Days              | 30    | 6  | 11 | 5  | 8  |
| Movement                  | 41    | 25 | 4  | 6  | 6  |
| A Day in the Life         | 25    | 6  | 7  | 9  | 3  |
| Mother Nature's           |       |    |    |    |    |
| Recipe                    | 20    | 7  | 4  | 7  | 2  |
| Mini-parts                | 10    | 5  | 3  | 1  | 1  |
| Computers                 | 19    | 8  | 4  | 6  | 1  |
| Cells                     | 12    | 10 | 1  | 1  | 0  |

Summary: 48.9% of the activities are ST  
20.9% of the activities are SF  
14.4% of the activities are NT  
15.8% of the activities are NF

Appendix Q LoU Interview Questions for  
the Primary Environmental Studies Program

221

user/nonuser

If the individual has established a regular pattern of use of the Primary Environmental Studies Program which is considered to be the main planning tool, he/she may be considered to be a user.

Are you using the Primary Environmental Studies Program in your classroom? Can you describe for me how you use it? Is it your main planning tool for environmental studies? (distinguish between users and nonusers)

What do you see as the strengths and weaknesses of the program? What have you done about this? (knowledge and assessing categories)

Are you currently looking for any information about the program? What kind? For what purpose? (acquiring information category)

Do you work with others in your use of the program? Do you meet on a regular basis? Have you made any changes in your program based on this exchange? (LoU V: If yes, go to probes below).

Do you ever talk with others about the program? What kinds of things do you talk about? (sharing category)

What do you see as being the effects of the program? How did you come to that conclusion? Are you doing any evaluating, either formally or informally, that would affect your use of the program? Have you received any feedback from your students that would affect the way you are using the program? What have you done with this information? (assessing category)

Have you considered any alternatives or different ways of doing things with the program? What? Why? How recently? Are you considering making any changes? (LoU III, IVa, IVb)

Appendix Q LoU Interview Questions for  
the Primary Environmental Studies Program

222

As you look ahead to later this year, what plans do you have in relation to your use of the program?  
(planning and status reporting categories)

Perhaps you are not ready to answer this question yet, but just in case, are you considering or planning to make major modifications to the program at this time?  
(LoU VI)

LoU V probes:

Please describe for me how you work together. What things do you share with each other? What do you see as the effects of this collaboration? Are you looking for any particular kind of information in relation to this collaboration? Do you talk with others about your collaboration? If so, what do you share with them? Have you done any formal or informal evaluation of how your collaboration is working? What plans do you have for this work together in the future?  
(go to sharing if not a V)

Note. From Measuring levels of the innovation: A manual for trainers, interviewers, and raters (pp. 24-25) by Loucks et al., 1975, Austin: University of Texas, Research and Development Center for Teacher Education. Adapted by permission.

Appendix R Initial Interview with Program 223  
Developers and Implementers

Why did you choose to work on this task?

What do you hope to be offering that is different?

What are the critical components?

Describe the structure of the units. How were they planned?

How did you choose the topics? Which topics were left out?

How were you able to group them? Why did you group them the way you did?

What makes the units unique?

Do you think the teachers will have preferences among the units? Why?

Describe a fully implemented program.

Do you feel that some of the units can be implemented more fully than others? Why?

Why do you think this type of program is being advocated by the Ministry?

What does the image of the student in the curriculum imply for classroom organization? What do the students do?

How may this shape the way teachers come to view students? What do teachers do?

What does the program suggest for teacher/student interaction? student/student interaction?

What does this program allow students to do that they might not normally have done?

What does this program allow teachers to do that they might not normally have done?

What major teaching methods are used?

What framework did you use for putting the program together?

Ideally, what beliefs should a teacher have to implement this program?

What values is the program promoting?

Appendix R Initial Interview with Program 224  
Developers and Implementers

What would you say is the central critical issue of this program?

What decisions does a teacher have to make in order to teach this program?

Describe how a teacher who is implementing the program might go about planning a unit? How about one who is not implementing the program?

What are the key elements of the program?

What do you foresee are possible difficulties in implementing this program?

Could you describe some different ways the program might be taught? Which ones are acceptable? Which ones are not?

Choose one unit and describe it in such a way to show what it would mean to implement it as fully as possible.

How much time should the teacher devote to this program?

What are the strengths of the program?

What are the weaknesses of the program?

Describe the contents of the kits. How did you choose which units would have activities designed for them?

How far were you able to get in providing resources for the units?

Do you have a list of which units have resources and the components of these units?

Would the availability of the resources vary from school to school? Why?

Do you feel that the availability of resources can seriously interfere with the level of implementation of the program? Why?

What are the reasons for the differences in the availability of the resources?

Developers, Implementers, and Users

Could you give a description of an ideal unit.

What are the key elements of the program?

What would be an acceptable degree of use of the program to consider a teacher as using the program?

Could you imagine that you are talking to a teacher and you are interested in finding out if he or she is using the program. What questions would you ask?

If you were interested in finding out if the \_\_\_\_\_ aspect was being used, what questions would you ask?

Could you describe an ideal implementation of this aspect for me.

What would be unacceptable as far as this program is concerned?

How is it most typically being done?

Why do you think some teachers pick some activities and not others?

Would it be possible to teach the social studies, health, and science components separately? How would you know?

What is the impact of the double grades?

How could the teachers structure their environment?

Which team members did which part?

What role does the Silver Burdett program play?

What have you done to implement the program?

What other things have been done?

In addition to the above questions, echo techniques were utilized and additional probes were made to collect as accurate information as possible.

## Interview Questions

(The next three sets of questions are probing questions to determine the individual program configurations.)

Thank you for your perceptions of the program in general. Could we now spend some time on the specifics. Could you try to focus on the one topic at hand so I can get a clear understanding of what you are telling me. It may be a little redundant but please bear with me.

Could we start with the idea of using materials.

user/nonuser

The children manipulate materials during environmental studies time.

Do you use the activity kits?

Thinking about the use of materials in general, could you describe for me how you go about teaching a program?  
etc.

Could we start with the ideas of how you work with your students.

user/nonuser

The students have some choice in the activities which are done.

When you are teaching one of the units in environmental studies, do your students make some choices without your assistance?  
etc.

Could we start with the idea of integrating other subject areas.

user/nonuser

The teacher uses other subject areas to teach the primary environmental studies program.

Are you able to do some integration of other subject areas with the primary environmental studies program?  
etc.

Note. The sequence of the questions (i.e. hands-activities,

Interview Questions

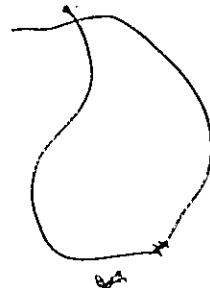
child-centred approach, and integration) will be random to reduce order effect.

That's fine. Now could we talk about....

Closing: I think you did very well. You have told me a lot which will help me with my research. Thank you very much.

or

You have certainly helped me. What you have been saying is very important for my research. Thank you very much.



Interview Questions

Questions for Hands-on Activities

user/nonuser

The children manipulate materials during environmental studies class.

Do you use the activity kits?  
Thinking about the use of materials in general, could you describe to me how you go about teaching the program?

A. Kinds of Materials

What other kinds of materials do you use in your teaching?

How do you get these materials? Do the children bring anything in?

Have you had the time to make any materials yourself?

B. Student/Teacher Handling of Materials

How do you set up the materials? How do you distribute them?

Do the students use the materials? In what way? Do you handle the materials yourself? In what way?

Have you found enough resources to do what is needed?

Do the students handle the materials most of the time or do you do so because of a lack of resources?

Interview Questions

Questions for the Child-centred Approach

user/nonuser

The students have some choice in the activities which are done.

When you are teaching one of the units in environmental studies, do your students make some choices without your assistance?

A. Kinds of Student Choice

What kinds of decisions can your students make on their own?

Can your students decide what to do in their spare time?

Can your students initiate projects of their own?

Can your students decide in what order to do the activities?

Can your students decide which activities to do?

Can your students decide how long to work on an activity and when to work on the activity?

Can your students decide on the follow-up to a lesson?

B. Type of Planning

If you are teaching a split grade, could you concentrate for now only on one grade--the bigger group.

How do you go about planning the activities for your students?

Do you plan so that all the children do the same activities?  
(How do you determine which children in your class do which activities?)

Are there some activities which are only done by some children?

(Does this depend on particular groups or particular individuals?)

How do you find out what your students are interested in?  
Do you involve them in your planning?

Interview Questions

C. Classroom Setup

Could you tell me how your students are seated?  
single rows? double rows? in groups? (desks or tables)

Is this your personal preference? Has your principal asked  
you to set up your classroom in a particular way?

## Interview Questions

Questions for Integration

user/nonuser

The teacher uses other subject areas to teach the primary environmental studies program.

Are you able to do some integration of other subject areas with the primary environmental studies program? In what way?

A. Kinds of Integration

When you go to plan a unit could you describe what you do?

What do you use to plan?

Do you use the Unit Planning Record Sheets? How?

Is there anything else which helps you plan your integration?

What subjects are you able to integrate? How?

Do you use other subject areas to supplement the environmental studies program?

Do you use the environmental studies program to develop a theme to bring in other subject areas?

Do you teach on a theme basis? To what extent?

How do you go about planning for this approach?

Could you describe your long-range plans.

B. Kinds of Scheduling

Could you describe for me your schedule for environmental studies?

Do you find you are able to stick to this timetable?

Are there any exceptions to this?

Interview Questions

Is it because you needed more time to finish an activity?

Is it because the children were interested?

Do you plan extended classes?

Are you pleased with your present timetable?

C. Use of Activity Centres

How do you set up your classroom so that the children have access to the materials?

Do you have an activity centre for environmental studies?  
(How many?)

Do you like using this centre or do you consider it a requirement?

Who uses this centre? When is it used?

## Checklist

Hands-on ActivitiesA. Kinds of Materials

1. activity kits may be used  
primary resources (objects found in the child's environment; basic equipment e.g. magnifying glasses)  
secondary resources (filmstrips, slides, pictures, books)  
children/parents bring things in  
teacher-made materials
2. activity kits may be used  
primary resources  
secondary resources  
children/parents bring things in or teacher-made materials
3. activity kits may be used  
primary resources  
secondary resources or children/parents bring things in
- 
4. activity kits may be used<sup>a</sup>  
primary resources  
secondary resources

B. Student/Teacher Handling of Materials

1. students are handling the materials the majority of the time in groups or individually
2. the teacher handles the materials the majority of the time while the students watch (or a student demonstrates)
- 
3. the teacher uses the materials mainly for display purposes

<sup>a</sup>description below the line represents an unacceptable type of program delivery in relation to the goals of the program

## Checklist

Child-Centred ApproachA. Kinds of Student Choice

- 1. spare-time activities  
student-initiated projects  
sequence of activities  
which activities or own choice of follow-up  
time-on-task (how long and when any time of the day)
- 2. spare-time activities  
student-initiated projects  
sequence of activities and/or which activities
- 3. spare-time activities and/or student-initiated  
projects  
sequence of activities

---

- 4. students decide only what to do in their spare time

B. Type of Planning (check re split grades)

- 1. teacher and students together plan different  
kinds and number of activities based on the  
student needs (includes #2 and #3)
- 2. teacher prepares different kinds and numbers of  
activities based on the needs of individual students  
in addition to the planning for groups
- 3. teacher prepares different kinds and numbers of  
activities based on the needs of student groups

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- 4. the teacher plans for all the students based on  
need in general

C. Classroom Setup (ask for a preference)

- 1. students sit in groups (tables/desks)
- 2. students sit in double rows

---

- 3. students sit in single rows

## Checklist

IntegrationA. Kinds of Integration

- 1. full integration: the teacher uses the objectives and/or skills of the majority of subject areas to use the thematic approach comprehensively in teaching; the teacher has developed her own integrated program to do this
- 2. partial integration: the teacher uses the objectives and/or skills of a few subject areas to use the thematic approach with environmental studies
- 3. the teacher may utilize the integration suggestions from the Unit Planning Record Sheets and examines the objectives and/or skills of some of the other programs to supplement the environmental studies program; the teacher may also achieve some integration by supplementing the program with his/her own ideas without formally examining other programs but with the intent to integrate

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- 4. the teacher may utilize the integration suggestions from the Unit Planning Record Sheets without examining the objectives and/or skills of some of the other programs or uses only the activities outlined in the units (very few self-initiated integration attempts are made)

N.B. disregard seasonal themes for classification  
(evident in any classroom)

B. Kinds of Scheduling

- 1. majority of the teaching is by a thematic approach which is in effect most of the day
- 2. timetable is somewhat fluid because of some subject integration which is taking place

---

- 3. majority of the teaching takes place within the framework of a fixed timetable (exceptions: school interruptions, students need more time, or are especially interested in a particular topic)

## Checklist

C. Use of Activity Centres

- 1. students manipulate the materials via different activities at a number of centres spread out in the classroom
- 2. students have access to at least one activity centre set up for environmental studies

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- 3. the activity centre is being used as a free time activity or as a reward for getting other work done
- 4. no activity centre

Appendix V Researcher Reliability on the  
Levels of Use and Innovation Configurations

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| <u>LoU</u> | <u>Hands-on Activity</u> | <u>Child-centred Approach</u> | <u>Integration</u> |
|------------|--------------------------|-------------------------------|--------------------|
| V          | 11                       | 221                           | 111                |
| V          | 11                       | 221                           | 111                |
| III        | 12                       | 243                           | 331                |
| III        | 22                       | 343                           | 331                |
| III        | 11                       | 111                           | 211                |
| III        | 11                       | 111                           | 231                |
| III        | 11                       | 341                           | 331                |
| III        | 12                       | 241                           | 331                |
| IVa        | 11                       | 111                           | 221                |
| IVa        | 11                       | 111                           | 231                |
| III        | 11                       | 221                           | 221                |
| III        | 11                       | 222(x)                        | 221                |
| IVb        | 11                       | 241                           | 131                |
| IVb        | 11                       | 141(x)                        | 131                |
| IVa        | 11                       | 222                           | 231                |
| IVa        | 11                       | 222                           | 231                |
| III        | 22                       | 212                           | 331                |
| III        | 22                       | 212                           | 331                |
| V          | 11                       | 111                           | 111                |
| V          | 11                       | 111                           | 111                |
| VI         | 11                       | 211                           | 121                |
| VI         | 11                       | 111(x)                        | 111(x)             |
| III        | 11                       | 233                           | 331                |
| III        | 11                       | 233                           | 331                |
| VI         | 11                       | 121                           | 111                |
| V          | 11                       | 121                           | 121(x)             |
| IVb        | 11                       | 221                           | 121                |
| IVb        | 11                       | 221                           | 121                |
| IVa        | 11                       | 221                           | 433                |
| IVa        | 11                       | 121(x)                        | 433                |

Note. first line = researcher. second line = rater. (x) represents a difference not absorbed by collapsing categories

## Indicator

Directions

This questionnaire gives you an opportunity to describe the types of teaching activities you prefer. The examples given are drawn from the Primary Environmental Studies Program. Since each item is made up of activities from the program, there are no right or wrong answers. Please read each item and rank the four activities according to your own teaching preference.

In making your decision please keep in mind the following:

- a) Imagine that everything is ready for you and it is just a matter of doing the activities with your students.
- b) Resources and equipment are not a problem.
- c) The children are capable of doing the activities.
- d) One activity is not better than another.
- e) In indicating your preferences do not consider the "importance" of a particular concept, but concentrate on your most preferred type of activity.

Write number "1" beside your most preferred activity.

Write number "2" beside your second most preferred activity.

Write number "3" beside your third most preferred activity.

Write number "4" beside your fourth most preferred activity.

Please do not leave any blank spaces. Be sure to assign a different number to each of the four activities. (i.e. do not use the same number twice in each group.)

MANY THANKS FOR YOUR HELP AND COOPERATION

Rank the activities in each group by putting a 1, 2, 3, or 4 in the spaces provided to indicate the order of your preference.

Group I

- \_\_\_\_\_ a. Have the children create shoe-box dioramas using scrap paper, plasticene, and collage materials. Their creations can then form an animal habitat display.
  
  - \_\_\_\_\_ b. Provide the children with names of uncommon animals. Ask them to predict which animals on the list have offspring that resemble the parents when they are born. Have them give you the reasons for choice and have them check their predictions by doing some research.
  
  - \_\_\_\_\_ c. Share a poem called "Wiggles and Squiggles" with the children. Have them read it aloud to a partner.
  
  - \_\_\_\_\_ d. Have the children sort animal word cards and choose the animals that resemble their parents at birth. Have them choose the animals that do not resemble their parents at birth.
- 

Group II

- \_\_\_\_\_ e. Have the children look through magazines to find and cut out pictures of places with hot, cold, or changing climates. Have them prepare a temperature booklet and write statements about the weather in each picture.
  
- \_\_\_\_\_ f. Read the poem "Flying in the Wind" to the children. Take the children outside to play with the pinwheels they made.
  
- \_\_\_\_\_ g. Using an eye dropper, drop water on different types of fabric. Ask the children why some fabrics absorb more water than other kinds of fabric. Ask them which materials would make a good raincoat.
  
- \_\_\_\_\_ h. Have the children write stories about a snowstorm, a rainy day, sunny day, or windy day.

### Group III

- \_\_\_\_\_ i. Have the children read stories about different communities. Tape the readings so that the children can listen to each other at the listening centre.
  - \_\_\_\_\_ j. Ask the children to bring in pictures of buildings in their community. Have the children categorize the buildings according to shape, height, and colour.
  - \_\_\_\_\_ k. Have the children imagine what an ideal community would be like. Have them make a model of it.
  - \_\_\_\_\_ l. Have the children analyze the environmental impact of one main occupation in their community.
- 

### Group IV

- \_\_\_\_\_ m. Have the children conduct research on what people of different ages do. Ask them to do some interviewing to gather the data about children, teenagers, and adults.
- \_\_\_\_\_ n. Have the children fill out a sheet called "My Favourites." Have them share their work with a friend so that they can talk about themselves (e.g. best friends, favourite colour, food, sports, pets, and songs).
- \_\_\_\_\_ o. Have the children list some features about their family members (i.e. height, eye and hair colour, hair length). Have them make line and bar graphs using this information.
- \_\_\_\_\_ p. Have the children create paper-bag puppets by gluing different coloured yarn and scraps of material on the bags. Have them present short skits using their puppets.

Group V

- \_\_\_\_\_ q. Have the children draw tracks of mythical animals and then write a story about them.
- \_\_\_\_\_ r. Have the children talk about different kinds of animals (i.e. where they live, what they eat, etc.). Have them share this information in small groups.
- \_\_\_\_\_ s. Look at pictures of plants and animals (e.g. cow eating, plant being watered, dog sleeping.) Discuss the idea of "need": what a living thing must have in order to stay healthy and grow. Have them talk about the different kinds of needs of plants and animals. In what way are they the same? In what way are they different?
- \_\_\_\_\_ t. Have the children classify animal cards to make groups of crawling creatures, walking creatures, flying creatures, hopping creatures, and swimming creatures.

---

PLEASE COMPLETE THE FOLLOWING

Name \_\_\_\_\_

Number of years teaching experience in:

intermediate/senior grades (7-12/OAC) \_\_\_\_\_

junior grades (4-6) \_\_\_\_\_

primary (1-3) \_\_\_\_\_

kindergarten (JK-SK) \_\_\_\_\_

Total experience \_\_\_\_\_

How long have you been teaching the new Environmental Studies Program? (please check one)

\_\_\_\_\_ in my first year \_\_\_\_\_ in my second year

## for the Validation of the TAPI

Instructions to the Judges

You have been chosen to participate in the validation of the Teaching Activity Preference Indicator because of your background and knowledge of the Myers-Briggs Type Indicator and the theory on which it is based. You are being asked to classify each of the activities as ST, SF, NT, or NF. Each group consists of four activities and each group contains one example of each of the above classifiers. Please write ST, SF, NT, or NF in the blank spaces provided. Would you also indicate the reasons for your choice by underlining the key words or by making a notation in the margin.

You may use the descriptions below as well as the enclosed overview diagram as reference at any time:

ST activities usually have right or wrong answers and require students to draw upon recall, memory and comprehension. The instructional strategies may include , drill, lecture, programmed instruction, seatwork, homework, questions & answer sessions, practice, worksheets, workbooks, hands-on activities, demonstrations, field trips and competitive games.

SF activities involve the students personally and emotionally in their learning. Cooperation and collaboration is emphasized. The instructional strategies may include sharing personal feelings and experiences, social problem-solving, role plays, simulations, peer tutoring, small and large group projects, team games, sensitivity training, team-building, and consensus decision-making.

NF activities allow the students to explore their creative abilities, find ways for self-expression, and explore personal values. The instructional strategies may include open-ended discussions, discussing moral dilemmas, values clarification, creative and artistic activities, creative writing, inventing, imagining, and writing poetry.

NT activities challenge the students to think critically, to deduce consequences, to compare and contrast, to analyze, synthesize, and evaluate alternatives. The instructional strategies may include independent research, reading assignments, written essays, debating issues, problem-solving, divergent thinking, the Socratic method of questioning, lecture, systems analysis, theorizing, and research methods.

As you read each activity, please identify the dominant psychological function. In other words, what is the primary purpose of the activity?

examples:

- \_\_NF\_\_ a. A rainy day makes me feel....  
I wake up and find snow and feel....  
(creative Sunny days make me feel...  
expression) Watching a tornado makes me feel....  
When I observe lightning, I....  
Dark storm clouds make me....
- \_\_NT\_\_ b. Tell the children that they will be  
experimenting to find out if plants can live  
(predicting) without warmth, air, soil, light, and water.  
Have them predict what they think will  
happen.
- \_\_ST\_\_ c. Have the children take a nature walk to  
collect as many different seeds as possible  
(hands-on (e.g. acorns, hickory nuts, maple wings,  
activity) pinecones, and weed seeds).
- \_\_SF\_\_ d. Read some poems dealing with nature to the  
children.  
(personal experience)

Please note: The children are experiencing a piece of poetry. If they were writing their own poem, this would be a creative activity (NF).

MANY THANKS FOR YOUR HELP AND COOPERATION

Note. The descriptions of the activities in the instructions are adapted from Teacher self-assessment (p. 96) by H. F. Silver and J. R. Hanson, 1982, Moorestown, NJ: Hanson, Silver, & Associates, Inc. The overview diagram mentioned in the instructions is Appendix O in the present study.

## TAPI Validation

| Judge         | 1         | 2         | 3  | Researcher |
|---------------|-----------|-----------|----|------------|
|               | <u>SF</u> | NF        | NF | NF         |
|               | NT        | NT        | NT | NT         |
|               | <u>NF</u> | SF        | SF | SF         |
|               | ST        | ST        | ST | ST         |
|               | ST        | ST        | ST | ST         |
|               | <u>NF</u> | SF        | SF | SF         |
|               | <u>SF</u> | NT        | NT | NT         |
|               | <u>NT</u> | NF        | NF | NF         |
|               | SF        | SF        | SF | SF         |
|               | ST        | ST        | ST | ST         |
|               | NF        | NF        | NF | NF         |
|               | NT        | NT        | NT | NT         |
|               | SF        | <u>NF</u> | SF | SF         |
|               | ST        | <u>SF</u> | ST | ST         |
|               | NF        | <u>ST</u> | NF | NF         |
|               | NF        | NF        | NF | NF         |
|               | SF        | SF        | SF | SF         |
|               | NT        | NT        | NT | NT         |
|               | ST        | ST        | ST | ST         |
| Total Correct | 20        | 22        | 25 | 25         |

Memorandum to: ALL ELEMENTARY SCHOOL PRINCIPALS

From: Floriana Albi

Date: January 5, 1987

Re: Myers-Briggs Type Indicator

As you know, I am currently studying why teachers enjoy teaching in particular ways. In this first stage of my research, I am distributing a questionnaire entitled the Myers-Briggs Type Indicator to the primary teachers in grades one to three. There are no right or wrong answers to the instrument. The answers simply show how one likes to go about deciding things. The questionnaires are going out in two mailings:

January 5, 1987

or

January 12, 1987

I have supplied your teachers with addressed envelopes for their responses. I hope to make their participation in this project worthwhile by providing them with feedback on the indicator and elaborating more fully on my research plan sometime in the late spring.

The above is simply an information item for you.

January 5, 1987

Dear Colleague,

I am currently studying why teachers enjoy teaching in particular ways. In this first stage of my research, I am distributing a research questionnaire entitled the Myers-Briggs Type Indicator to primary teachers in our school board. I would sincerely appreciate your help by completing the enclosed and returning the response sheet and the booklet in the envelope provided. When you are completing this questionnaire, aim for a "shoes-off self," that is, responses with which you are most comfortable.

I hope to make your participation in this project worthwhile by sharing my findings with you sometime in the late spring. At that time, I should be able to give you feedback on the indicator and elaborate more fully on my research plan.

Thank you very much for your cooperation. Please rest assured that all information shall remain confidential. At the same time, however, your input will provide essential data to what I consider to be an exciting and very worthwhile research project.

Sincerely,

*Floriana Albi*

Floriana Albi

Please return your response by Monday, January 12, 1987

N.B. Your early response will ensure that the second group will get their booklets on time. Many thanks!

January 19, 1987

Dear Colleague,

I am currently studying why teachers enjoy teaching in particular ways. In this first stage of my research, I am distributing a research questionnaire entitled the Myers-Briggs Type Indicator to primary teachers in our school board. I would sincerely appreciate your help by completing the enclosed and returning the response sheet and the booklet in the envelope provided. When you are completing this questionnaire, aim for a "shoes-off self," that is, responses with which you are most comfortable.

I hope to make your participation in this project worthwhile by sharing my findings with you sometime in the late spring. At that time, I should be able to give you feedback on the indicator and elaborate more fully on my research plan.

Thank you very much for your cooperation. Please rest assured that all information shall remain confidential. At the same time, however, your input will provide essential data to what I consider to be an exciting and very worthwhile research project.

Sincerely,

*Floriana Albi*

Floriana Albi

Please return your response by Monday, January 26, 1987

## INSTRUCTIONS FOR THE RESPONSE SHEET

A sample optical scanning answer sheet is attached. This is not a test, but a preference indicator. There are no right or wrong answers.

Please: Use a soft lead pencil and blacken the response spaces completely.

Do not mark the booklet in any way and return it with your response sheet.

Read the directions on the booklet cover carefully.

Response Sheet

The top half of the sheet is for identification purposes. By blackening in the appropriate spaces, please indicate the following:

Column 1: "F" for female or "M" for male.

Column 4 and 5: your age

Column 7 and 8: grade you teach

|     |           |
|-----|-----------|
| 1   | grade 1   |
| 1 A | grade 1/2 |
| 2   | grade 2   |
| 2 A | grade 2/3 |
| 3   | grade 3   |
| 3 A | grade 3/4 |

Identification number: Please blacken in the appropriate spaces to indicate the first six digits of your social insurance number.

Please write in your name at the bottom of the response sheet. The computer will not pick up this information. It is for my record-keeping purposes only. The bottom half of the response sheet is for your answers. Please make sure your answer space has the same number as the question you are answering.

MANY THANKS FOR YOUR COOPERATION!



Appendix B1 Feedback Letter to  
the Teachers

250

April 21, 1987

Dear Colleague,

I would like to take this opportunity to thank you for being so supportive and cooperative regarding the data collection for my research. Of 128 questionnaires mailed out to primary teachers, 99 were able to respond in time to participate. This is an extremely high return rate. The second part of the research involved a one-hour interview with 60 selected subjects. There is no doubt in my mind that the research was possible because of the support which was so freely given. A special thank-you then to you for taking part. Time is a precious commodity and I sincerely appreciate your generosity!

I have decided to offer a workshop on my research (see flier). It is the least I can do in return for your help. If you are interested and have the time, you are most welcome to attend. My research is focused on investigating the relationship between personality style and preferences for particular kinds of teaching activities using the Primary Environmental Studies Program. Thus, the workshop topic is: "Application of the Myers-Briggs Type Theory to Curriculum."

In addition, enclosed please find your results on the indicator. The indicator questions deal with the way you like to use your perception and judgment, that is, the way you like to look at things and the way you like to go about deciding things. The answers given reflect four separate preferences called EI, SN, TF, and JP. The four letters of your "type" indicate how you came out on all the four preferences which are explained below:

a) An E for extraversion probably means you relate more easily to the outer world of people and things.

An I for introversion probably means you relate more easily to the inner world of ideas.

b) An S for sensing probably means you would rather work with known facts.

An N for intuition probably means you would rather look for possibilities and relationships.

c) A T for thinking probably means you base your judgments more on impersonal analysis and logic.

An F for feeling probably means you base your judgments more on personal values.

d) A J for the judging attitude probably means you like a planned, decided, orderly way of life.

A P for the perceptive attitude probably means you like a flexible, spontaneous way of life.

The instrument is not 100% reliable (no instrument is). If your score shows a slight preference, or a low moderate one, then you probably know yourself best and can determine your type more accurately. I will be pleased to answer questions at the workshop.

Sincerely,



Floriana Albi

A computer printout of the results was given to each teacher with the following directions:

INSTRUCTIONS

1. Look at the first column and find your identification number. As you may recall you were asked to submit the first six digits of your social insurance number.
2. Follow the line across and find the four letters which represent your type.
3. The results also indicate your strength of preference for the different decision-making styles (the next four columns after your type). You may calculate your preference by noting the difference between your score and 100.

For example, if your type were INTJ with the following scores: 121, 103, 93, and 97, your strength of preference would be 21 (I), 3 (N), 7 (T), and 3 (J).

RANGES FOR THE SCORES

|   |             |             |
|---|-------------|-------------|
| E | 51...0...57 | I           |
| S | 67...0...51 | N           |
| T | 65...0...39 | F (males)   |
|   | 65...0...43 | F (females) |
| J | 55...0...61 | P           |

STRENGTH OF THE SCORES

|         |                                     |
|---------|-------------------------------------|
| 1 - 7   | slight, close, or middle preference |
| 8 - 20  | moderate preference                 |
| 21 - 40 | clear preference                    |
| 41+     | strong preference                   |

On the TF scale, 34+ is considered strong

PLEASE NOTE: THE STRONGER YOUR PREFERENCE, THE HIGHER THE PROBABILITY THAT YOUR SCORE IS CORRECT.

## Frequencies on the Variations of the Critical Components

| <u>Component</u>     | <u>Dimension</u>                            | <u>Variation</u>           | <u>Frequency</u> |    |
|----------------------|---|----------------------------|------------------|----|
| Hands-on<br>Activity | Kinds of materials                          | 1                          | 44               |    |
|                      |   | 2                          | 15               |    |
|                      |   | 3                          | 0                |    |
|                      |   | 4                          | 1                |    |
|                      | Student/Teacher<br>Handling of<br>Materials | 1                          | 46               |    |
|                      |   | 2                          | 13               |    |
|                      |   | 3                          | 1                |    |
|                      | Child-Centred<br>Approach                   | Kinds of Student<br>Choice | 1                | 5  |
| 2                    |   |                            | 43               |    |
| 3                    |   |                            | 5                |    |
| 4                    |   |                            | 7                |    |
| Type of Planning     |   | 1                          | 12               |    |
|                      |   | 2                          | 17               |    |
|                      |   | 3                          | 7                |    |
|                      |   | 4                          | 24               |    |
| Classroom Setup      |   | 1                          | 38               |    |
|                      |   | 2                          | 8                |    |
|                      |   | 3                          | 14               |    |
| Integration          |   | Kinds of Integration       | 1                | 12 |
|                      |   |                            | 2                | 13 |
|                      |   |                            | 3                | 25 |
|                      |   |                            | 4                | 10 |
|                      |   | Kinds of Scheduling        | 1                | 9  |
|                      | 2   |                            | 18               |    |
|                      | 3   |                            | 33               |    |
|                      | Use of Activity<br>Centres                  | 1                          | 29               |    |
|                      |   | 2                          | 20               |    |
|                      |   | 3                          | 8                |    |
|                      |   | 4                          | 3                |    |

Appendix D1 Raw Data of the Match Between 254

Personality Style and Preferred Teaching Activity Type

| Personality Style | Teaching Activity Type |      |       |    |  | TIES                     |
|-------------------|------------------------|------|-------|----|--|--------------------------|
|                   | ST                     | SF   | NF    | NT |  |                          |
| ST                | 9**                    | 2    | 3     | 3* |  | STNF; STNT; NTNF         |
| SF                | 8*                     | 5*** | 3     | 4  |  | STNT; SFST(2);<br>SFNTNF |
| NF                | 0                      | 5*   | 14*** | 1  |  | SFST; NFSF(2);<br>NFST   |
| NT                | 1                      | 0    | 2     | 0  |  |                          |

Note. For example, the number of sensing thinking subjects choosing sensing thinking activities as their first choice is 9. The number of asterisks indicates the number of subjects displaying tie preferences which were included in the total. First choice is defined as the lowest score on the Teaching Activity Preference Indicator profile.

ST = sensing thinking       $n = 17$

SF = sensing feeling       $n = 20$

NF = intuitive feeling       $n = 20$

NT = intuitive thinking       $n = 3$

Appendix E1 Raw Data of the Match Between 255  
 Personality Style and Preferences for Dichotomous  
 Teaching Activity Types (SN ; TF)

| Personality<br>Style | Teaching Activity Type |          |          |          |
|----------------------|------------------------|----------|----------|----------|
|                      | <u>S</u>               | <u>N</u> | <u>T</u> | <u>F</u> |
| ST                   | 13**                   | 4        | 9*       | 8        |
| SF                   | 15                     | 5        | 7        | 13       |
| NF                   | 9                      | 11**     | 1        | 19***    |
| NT                   | 1                      | 2        | 2        | 1        |

Note. The number of asterisks indicates the number of subjects displaying tie preferences which are included in the total. The SN and TF dichotomies are not mutually exclusive.

ST = sensing thinking       $n = 17$

SF = sensing feeling       $n = 20$

NF = intuitive feeling       $n = 20$

NT = intuitive thinking       $n = 3$

256

Appendix F1 Raw Data of the Match Between  
 Dominant Personality Style and Preferences for  
 Dichotomous Teaching Activity Types (SN ; TF)

| Dominant<br>Function | Teaching Activity Type |           |            |           |            |           |            |           |
|----------------------|------------------------|-----------|------------|-----------|------------|-----------|------------|-----------|
|                      | <u>S</u>               |           | <u>N</u>   |           | <u>T</u>   |           | <u>F</u>   |           |
|                      | <u>Yes</u>             | <u>No</u> | <u>Yes</u> | <u>No</u> | <u>Yes</u> | <u>No</u> | <u>Yes</u> | <u>No</u> |
| S                    | 12****                 | 5         |            |           |            |           |            |           |
| N                    |                        |           | 8*         | 3         |            |           |            |           |
| T                    |                        |           |            |           | 6*         | 3         |            |           |
| F                    |                        |           |            |           |            |           | 15**       | 8         |

Note. For example, the number of dominant sensing subjects displaying a preference for sensing activities (ST or SF) is 12. The number of asterisks indicate the number of subjects displaying tie preferences in their first choice (i.e. first preference shared with SF or ST in this case). First choice is defined as the lowest score on the Teaching Activity Preference Indicator profile.

- Dominant Sensing subjects: ESTP ISTJ ESFP ISFJ n = 17
- Dominant Intuitive subjects: ENFP INFJ ENTP INTJ n = 11
- Dominant Thinking subjects: ISTP ESTJ INTP ENTJ n = 9
- Dominant Feeling subjects: ISFP ESFJ INFP ENFJ n = 23