



THE NATURE OF INTERDISCIPLINARITY AND
ITS IMPLICATIONS FOR THE SECONDARY
SCHOOL IN NEWFOUNDLAND

by



A. George Chaulk, B.A., B.Ed.

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Memorial University of Newfoundland

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ABSTRACT

Education in the twentieth century has focused on an instrumental orientation that takes schools beyond the mere transmission of knowledge. A diversified education helps young people to cope with the phenomenal growth of knowledge and a plethora of social problems. Teaching methods and new subjects serve the needs of society and enhance students' ability to synthesize their fragmented educational experiences.

A traditional curricular structure did not acknowledge the diverse nature of knowledge nor the kinds of debate that society needed to address problems. Curricular models created to reflect disciplinary interests did not mirror the dynamic nature of knowledge or satisfy individual and social expectations of education.

Interdisciplinarity can dissolve the close partnership between school subjects and the disciplines and also provide a more coherent, responsive curriculum to suit a modern age. Furthermore, it is a reasonable response to the quest for social and personal relevancy. In fact, teaching subject matter in new contexts other than the disciplines is the cornerstone of the interdisciplinary philosophy.

The interdisciplinary approach helps the individual synthesize his educational experiences into meaningful patterns. Interdisciplinary learning theories postulate

that man prefers an inquiry, holistic approach to knowledge.

These philosophical and psychological themes provide the foundation and framework for the study of interdisciplinarity.

Interdisciplinarity has historical precedents. The successful curricula projects of the Progressive Education Association reveal challenging information for proponents of unified curricula in the modern school. In fact, all current interdisciplinary activities parallel efforts from the past.

There are several essential prerequisites to the definition of interdisciplinarity. These are factors that either facilitate or hinder comprehensive analysis of terms. An examination of both the theory and practice of interdisciplinarity provides a philosophical depth to definitions intended to guide the study of interdisciplinarity.

To focus on the nature of interdisciplinarity, a typology of related terms identifies a continuum of educational experiences that can be classified according to criteria selected to reveal the intensity and scope of the relationships in curricular unification efforts. These distinctive terms are necessary to distinguish among the tremendous varieties of interdisciplinary activities.

An examination of the development of secondary education in Newfoundland highlights possibilities for an

interdisciplinary approach. The revised program has the flexibility, in theory and in practice, to include interdisciplinarity as a viable alternative in both content organization and teaching practices. Skills, themes and problems are organizing principles that guide both the selection of content from all school subjects and classroom activities that unify the curriculum. Significant possibilities exist in Newfoundland's secondary schools for the development and implementation of an interdisciplinary approach to education.

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Finally, the writer appreciates the contribution of his wife, Gwen, to this thesis. Her maternal instinct instilled in the writer the sense of self-discipline and inspiration needed to finish the project. As a primary teacher, she shares her husband's interdisciplinary

vision. As a wife, she participates in interdisciplinary regularly, in ways indicated by this poem:

INTERDISCIPLINARY

His the comparison of literatures
Falling somewhere between the Beaker People
And Beatles; mine the house, and its offshoots:
One of them already approaching
His final degree, another masterful
Of the arts of his father, and third one.
Like me, undisciplined. But we are both listeners.

His discipline enjoyed reading to mine,
And doing the ironing, the chores,
I have been read to for decades,
Sometimes with benefit of translation,
Sometimes what only in its own tongue sings.
Free of any againbite of inwit or ennui,
I have listened, and have been the contemporary
Of queens who bestowed bracelets, broke rings.

(Nancy G. Westerfield, 1981)

The writer dedicates "Interdisciplinarity" to Gwen.

PREFACE

The essence of interdisciplinarity is captured in these quotations:

The world would not function
if there were not
somewhere,
outside time and space,
a cosmic point
of total synthesis.

(Pierre Teilard De Chardin, 1965)

Upon this age, that never speaks its mind,
This furtive age, this age endowed with power
To wake the moon with footsteps, fit an oar
Into the rowlocks of the wind, and find
What swims before his prow, what swirls behind.
Upon this gifted age, in its dark hour,
Rains from the sky a meteoric shower
of facts...they lie unquestioned, uncombined.
Wisdom enough to leech us of our ill
Is daily spun; But there exists no loom
to weave it into fabric....

(Edna St. Vincent Millay, 1917)

"...he is, above all, a Great Connector...[with] the ability to liberate people from static thoughts."

(Eulogy for R. Buckmaster Fuller,
December 1978, in Wolfe, 1984, p. 31)

TABLE OF CONTENTS

| | Page |
|------------------------------------------------------------|------|
| Abstract | ii |
| Acknowledgements | v |
| Preface | vii |
| CHAPTER I INTRODUCTION | 1 |
| Historical Development | 1 |
| Terminology | 3 |
| Implications for Secondary Education in Newfoundland | 5 |
| CHAPTER II HISTORICAL PERSPECTIVES | 6 |
| The Progressive Education Association | 7 |
| A New Philosophy of Knowledge | 8 |
| A New Psychology of Learning | 11 |
| New Curriculum Organization Forms. | 12 |
| Innovative Interdisciplinary Curricula | 15 |
| Concentration | 16 |
| Correlation | 17 |
| Fusion | 18 |
| Broad Fields | 19 |
| Core Curriculum | 19 |
| Administrative Precursors | 22 |
| Structure of the Disciplines Movement | 23 |

| | Page |
|--------------------------------------------------------------|------|
| Renewed Interdisciplinary Interest . | 28 |
| The 1960's: A Decade of Innovation | 29 |
| The 1980's: A Decade of Challenges | 30 |
| Conclusion | 32 |
| CHAPTER III TOWARDS DEFINITION: A DIFFICULT PROCESS | 33 |
| Introduction | 33 |
| Interdisciplinarity and Metaphor . | 34 |
| Indiscriminate Terminology | 34 |
| The Definition Process: An Illustration | 36 |
| Interdisciplinarity and Metaphor ... | 39 |
| Metaphor's Generative Potential .. | 41 |
| Limitations of Metaphoric Language | 44 |
| Moving Beyond Metaphor | 47 |
| Indiscriminate Terminology | 48 |
| A Reliance on Practice | 49 |
| Generic Terminology | 64 |
| Conclusion | 78 |
| CHAPTER IV AN INTERDISCIPLINARY TYPOLOGY | 81 |
| Two Dimensions: Scope and Intensity. | 81 |
| Multidisciplinarity | 83 |
| Pluridisciplinarity | 87 |
| Crossdisciplinarity | 88 |

| | Page |
|-------------------------------------------------------------------|------|
| Interdisciplinarity | 91 |
| Synthesis and Integration | 94 |
| Integration in Education | 98 |
| Levels of Integration | 103 |
| Conclusion | 107 |
| Transdisciplinarity | 108 |
| Transcendence | 111 |
| Transcendence and Dewey | 113 |
| The Case for the Disciplines | 115 |
| The Case for the Child | 123 |
| Holism | 127 |
| The Search for Holistic Methods .. | 129 |
| A Transdisciplinary Perspective .. | 135 |
| Conclusion | 137 |
| CHAPTER V | |
| INTERDISCIPLINARITY AND NEWFOUNDLAND'S SECONDARY SCHOOLS | 140 |
| The Critical Reformers of the 1960's | 140 |
| The Royal Commission on Education and Youth | 145 |
| Warren's Critique | 149 |
| The Task Force on Education | 152 |
| The Emergence of a Reorganized Secondary Program | 155 |

| | Page |
|--------------------------------------------------------------------------------------|------|
| Current Interdisciplinary Potential in Secondary Schools in Newfoundland | 160 |
| A Skills Approach to Interdisciplinarity | 165 |
| A Thematic Approach to Interdisciplinarity | 174 |
| A Problems Approach to Interdisciplinarity | 186 |
| Conclusion: A Transdisciplinary Vision | 219 |
| CHAPTER VI SUMMARY AND RECOMMENDATIONS | 227 |
| Implementation Strategies | 230 |
| Recommendations | 239 |
| REFERENCES | 246 |
| APPENDIX A: Correspondence | 276 |
| APPENDIX B: The Aims of Public Education in Newfoundland and Labrador | 330 |
| APPENDIX C: Selected Resources for Cultural Heritage Studies | 337 |
| APPENDIX D: Associations and Agencies | 340 |

CHAPTER I

INTRODUCTION

Ours has been called the "interdisciplinary age" (Kaufmann, 1977) and the "age of synthesis" (Bochner, 1969). Indeed, educators of the twentieth century have been periodically preoccupied with coherence in the curriculum. The writer intends to explore the concept of interdisciplinarity in order to clarify its meanings and examine its implications for the secondary school in Newfoundland.

Specifically, the writer's first obligation is to describe interdisciplinarity in an historical context, explaining its development and rationale. His second task is to define certain terminology, noting both theoretical and practical meanings. His final responsibility is to reflect on implications for Newfoundland's secondary schools.

Historical Development

Interdisciplinarity is one response to the age-old controversy of how to organize the school curriculum for instruction. Smith (1983, p. 31) stated that the problem is how "to unpack stored knowledge and to handle it in such a way as to facilitate optimum learning".

Beauchamp (1983) argued that interdisciplinarity is essentially an approach to curriculum design, a response to a fundamental curriculum decision.

The basic curriculum question is, and always has been, one of what shall be taught in the schools. An immediate corollary to that question has been that of how shall what has been chosen to be taught in the school be organized so as to best facilitate the subsequent decisions about teaching and learning. (p. 93)

Thus organized decisions made in response to these culminate in a curriculum design.

The separate subject curriculum has dominated education since the early 1900's, as an educational arm of the age of industrial development. Subjects based on the traditional scholarly disciplines were taught as separate, unrelated bodies of knowledge. During the 1960's these were updated to focus on the logical order inherent in the structure of concepts and methods of inquiry that characterized the individual disciplines. The curriculum design entrenched borderlines in knowledge and was evident in the structure of the secondary school - its schedules, classrooms and staff utilization. The curriculum lacked unity in these respects.

Some educators rejected the disciplines and stressed a more functional curriculum in which knowledge became a resource to solve personal and social problems. They argued that significant knowledge could not be confined to subjects based on disciplines, but was centered on the interests and needs of youth and society. Callahan (1977)

wanted to liberate the curriculum from the single focus study of subjects by concentrating on the "knower" rather than "what is known". This was the Progressive Education challenge: a dramatic emphasis on the learner. Interdisciplinarity reflects this orientation.

Terminology

The term "interdisciplinary" has become quite fashionable in education (Sherif and Sherif, 1969; Swora and Morrison, 1974; Thom, 1981). In fact, any organization of knowledge not confined to the disciplines is promptly called interdisciplinary since the intent is to capitalize on relationships among the disciplines. Thereby, the segmentation and compartmentalization in schools is diminished.

Thus the intent of interdisciplinarity is clear: it seeks to establish meaningful relationships among disciplines. The interaction that can result is crucial to any meaning of the word.

Inherent in any definition, therefore, is the idea that disciplines work in conjunction with some plan that purports to unite them in that endeavor. Interdisciplinarity attempts to synthesize experiences that are traditionally separated.

While there may be agreement on intent, there is little agreement on definition. One of the persistent

difficulties facing interdisciplinarity has been the lack of universally accepted terminology. It does not have uniform terminology (Swoboda, 1979; Kocklemans, 1979) nor a unifying language (Cohen, 1978). The use of multiple definitions has often confounded rather than enlightened the intellectual community.

Of course, there is no lack of effort to define the term. However, the definitions proposed tend to confuse more often than satisfy those interested in clarifying the term. Doyal (1974, p. 470) decried the state of "abounding confusion" in interdisciplinary work. McGrath (1978, p. 6) stated that terms have been "misused and misunderstood for more than half a century". Hamsch and Vollman (1983, p. 79) claimed that interdisciplinarity was "an ill-defined notion" and "a slogan to be made use of in and out of season in ideological debate".

This debate has made interdisciplinary activities difficult to identify. "A serious lack of discipline in the use of terminology has hampered progress", said Roy (1979, p. 167). The lack of precision in definition has been the primary cause of inconsistency among interdisciplinary activities. Mayville (1978, p. 58) blamed the "elusive definition" for the "inconsistencies besetting interdisciplinary endeavors". The complexity of practice labelled interdisciplinary is both a consequence of, and a reason for, this persistent problem of definition in interdisciplinarity.

Implications for Secondary Education in Newfoundland

Recent revisions in Newfoundland's senior high school program have revealed greater opportunities for interdisciplinary approaches in the classroom. The trend is away from the traditional curriculum and toward a more functional curriculum to meet the educational needs of the 1980's. Also, a climate of change is evident that is more conducive to challenging traditional attitudes and teaching methods. Of course, the usual restraints will tend to discourage innovation, particularly some of the dramatic changes in attitude and administrative arrangements needed for interdisciplinarity. However, the writer sees this as a viable alternative for Newfoundland schools, and is convinced that it will eventually gain acceptance by educators. He hopes that his endeavors will be timely and useful to anybody interested in implementing interdisciplinarity.

CHAPTER II

HISTORICAL PERSPECTIVES

Interdisciplinarity is a continuation of approaches to curriculum unification designed and used since early in the twentieth century. Current innovations are new only to those who are ignorant of the past, because much of today's inventiveness is merely "old wine in new bottles" (Eisner, 1975, p. 137). Educators would be well advised, therefore, to consider previous interdisciplinary efforts. Advocates of interdisciplinarity may be re-inventing curricular approaches that have historical significance and could benefit by studying the rationale for proposals made earlier, as well as successes and failures. The writer will attempt to show that current curriculum trends have a comprehensive historical background.

The demand for a coherent curriculum is a recurring phenomenon in history. Meil (1965) illustrated the cyclical nature of education with a spiral. Curriculum ideas neglected for a time are revived to attract new attention, along with the wisdom gained from the previous experiences. Interdisciplinarity is a curriculum priority from age to age, as a concern for unity replaces a sense of fragmentation brought on by specialization and advances in knowledge.

Fethe (1973, p. 490) characterized this state of affairs as an educational mirror of an ebb and flow in

society between "closely bound cohesion and fragmented anarchy". Each revival of interest in a unified curriculum paralleled a social call for coherence, a bringing together again. There are signs again of a move back toward unity in education in the attempt to counteract a fragmented curriculum.

The Progressive Education Association

Attempts to unify the curriculum intensified in North America with the advent of the Progressive Education Association in the early twentieth century. The intent was to organize curriculum around principles other than the distinct disciplines, whether these principles be social or personal concerns of students, or amalgamations of subjects similar in content or purpose.

The Progressives represented a growing dissatisfaction with the traditional subject-dominated curriculum. Outdated teaching practices, an explosion in knowledge, and an inadequate psychology of learning, culminated in a badly fractured and segmented curriculum. The emphasis was on accumulating facts contained in disciplines, ignoring the needs of students and social concerns. Educational reform was a reaction against "the isolation and mechanical character of school work" (Monroe, 1911, p. 211).

John Dewey and his contemporaries provided the gist of these criticisms. Dewey (1916) advised educators to avoid the discrete fact and stress knowledge to suit student needs. He argued that knowledge was treated as an end in itself and the goal of education became

to heap it up and display it when called for. This static, cold-storage ideal of knowledge is inimical to educative development. (p. 158)

Later Dewey (1933, p. 62) decried the "isolation of intellectual activities from the ordinary affairs of life".

Adams and Whitehead were other vocal critics at the turn of the twentieth century. Adams (1918, p. 319) concluded:

Nothing in education is so astonishing as the amount of ignorance it accumulates in the form of inert ideas.

Whitehead (1929, p. 10, 11) called this an education in "inert ideas" and "second-hand information". Pupils were "merely executing intellectual minutes" among a storehouse of factual data (p. 21).

These arguments were pleas for a new philosophy of knowledge, a new psychology of learning, and new organizational form for the curriculum.

A New Philosophy of Knowledge

Developments in epistemology were prompted by the inability of traditional scholarly approaches to cope with an exponential increase in the amount and kinds of

knowledge available to mankind. Restrictive theories of knowledge, upon close examination, were deemed to be inadequate and eventually discarded completely (Bochner, 1969). Specialist areas required new information not found in the traditional disciplines. Furthermore, research demanded new disciplines and fields that often interrelated distant subject areas. Interdisciplines and composite disciplines rapidly supplemented the traditionally discrete disciplines in both research and education.

Educators at both secondary and post-secondary levels responded to these developments in epistemology by designing a plethora of new courses for their programs (Tanner and Tanner, 1980). The expanded curricula were both too crowded and too fragmented to create meaningful educational experiences for students at both high school and university levels. Obviously, a curriculum derived from the traditional disciplines, utilizing teaching approaches appropriate to the concept of disciplines and discrete bodies of accumulated knowledge could not be maintained in an age of such rapid developments in epistemology.

The basis of the problem was an objectivistic view of knowledge (Hills, 1978). By this, school subjects were repositories of information to be consumed, and students were passive recipients of such knowledge. The goal of education was to supply an efficient vehicle to deliver

man's heritage. The subject became a simplified curricular structure that was administratively and socially convenient, but that tended to ignore the true nature of knowledge and prevented debate on more adventurous curricular structures.

Educators began to question their assumptions about knowledge and to debate whether a curriculum created to protect the integrity and autonomy of subjects was feasible in the atmosphere of progress of the early twentieth century.

In fact, the concept of knowledge was changing from product to process. The focus was shifting to man's active participation in his learning and knowledge as a changing, dynamic, fluid process, challenging the static, analytic conception of knowledge. Rather than a collection of ideas, knowledge became a means to enable a person actively to construct his own experiences as he sought meaning and coherence in his life. It was the recreation of each individual's experience, not "terminal achievements", but "reconstructed experience" (Tanner and Tanner, 1980, p. 38). As Bruffee (1981, p. 18) explained:

knowledge turns out not to be some composite, collective memory bank of mankind, but the combination of two mental functions: creative insight and what we have traditionally called "judgment".

Therefore,

" we must change the structure of learning to match...the structure of knowledge. (p. 185)

A new curriculum framework was needed.

A New Psychology of Learning

Furthermore, a new theory of learning was forthcoming to replace faculty psychology's theory of mental discipline. The traditional belief was that a specific initiation into discrete subjects was necessary to develop particular regions of the mind. Educators were preoccupied with analyzing the disciplines and isolating information thought necessary to educate young people's intellectual abilities. As Bigge and Hunt (1980) observed, educators rarely knew how or why the information should be organized mentally to achieve this purpose, other than faith in the belief that the mind's compartments had to be appropriately stored with facts.

Contrary to the theory of mental discipline, the new Gestalt theory posited man as an active being, creatively synthesizing his experiences and generating knowledge for himself. Learning is active inquiry, an holistic affair. The individual has a "mind-set and attitude which causes him to seek to organize material" (Kratwohl, 1958, p. 44). Accordingly, learning is a process whereby children relate to their environments to enhance their abilities to use information effectively. They abstract relationships and generalize to create patterns of experiences that make sense to them. The Gestalt theories provided a foundation for considering a child's motivation, personality development, and cognitive abilities in the curriculum.

New Curriculum Organizational Forms

The updated epistemological and psychological theories were incorporated into new approaches to the curriculum to facilitate more effective learning. These rejected the disciplines as the sole determiner of school subjects, substituting alternatives to the discipline-subject combinations widespread in education. The intent was to provide a coherent curriculum structure representing knowledge as patterns of meaningful experience instead of isolated facts.

This need for coherence was stated by Whitehead (1929, p. 10) in his call upon educators to revise traditional curriculum designs to "eradicate the fatal disconnection of subjects which kills the vitality of our modern curriculum". He stated that the curriculum is

a rapid table of contents which a deity might run over in his mind while he was thinking of creating a world, and had not yet determined how to put it together. (p. 11)

This was a rigorous demand for a more unified curriculum approach.

Dewey (1956, Revised Edition, p. 91) exemplified the Progressive Education quest for revised curricula with his comment:

We do not have a series of stratified earths, one of which is mathematical, another physical, another historical and so on... We live in a world where all sides are bound together.

Consequently, the subject matter of the curriculum would

be made more significant to the learner if it were used to enrich his personal experience in daily activities.

According to Dewey (1916), education must be student centered and made relevant to life's experiences. Knowledge is an instrument used to manipulate the world. Education is a process intending to help the student increase his ability to direct his own affairs. All school subjects should rise naturally from a study of social life and a focus on real life situations, rather than being imposed by adult constructs and abstract knowledge. Only then would the curriculum be relevant, meaningful and coherent to the student.

Obviously, Dewey's education was rooted in Gestalt psychology, promoting unified, holistic experiences for students. Since subject matter is an outgrowth of a child's immediate experience and tendencies, the subject must be "psychologized", that is, translated into "the immediate and individual experiencing within which it has its origin and significance" (1902, p. 63). The material is transformed as it develops within the range and scope of the child's life. Each person organizes his experiences in ways that gradually approximate the matured subject distinctions valued by society.

An obvious corollary to Dewey's principles was a rearrangement of the curriculum that contrasted with the logical organization of knowledge into subjects. Any psychological organization of knowledge needed to

capitalize on the student's motivation, interest and desire to learn, and used non-traditional patterns of content-organization that crossed subject boundaries.

Dewey's curriculum centered on student involvement with practical problems. Knowledge is then of utilitarian value, as a student creates solutions to socially or personally relevant concerns. His Laboratory School, founded in 1896 to test his theories, organized the curriculum around fundamental daily activities in society. The child - not the disciplines - was prominent in all aspects of schooling.

Dewey's education was unified around the project method and reflective thinking, both interdisciplinary by nature. The project focused student attention on problem solving strategies and first-hand experience. White (1978) attributed to Dewey the first such efforts to give the project prominence in education.

Such involvement in practical experience both motivated better learning and fostered an activity that Dewey (1916) named reflective thinking. This was a quality of thinking not confined to any specialized domain of knowledge but extended to any form of problem solving activity. Dewey (1933) described five steps to achieving reflective thinking, all designed to illustrate the interdisciplinary nature of this mental performance and indicate curriculum arrangements to foster its development.

Experimental attempts to unify the curriculum achieved status and wider recognition in the heyday years of the Progressives. The 1920's and 1930's "spawned a variety of integrative curriculum designs" (Vars, 1982, p. 216). In fact, according to Trump and Vars (1976), the basic curriculum alternatives to subjects have changed very little in spite of changes in terminology. Mayville (1978) described interdisciplinary programs as experimental revivals from the 1930's. The major impact from the Progressives was, as Meil (1965, p. 14) concluded,

the insight that the individual can deal with many separate experiences and put them together into meaningful and orderly wholes if he has the right kind of help.

The experiments were designed as administrative devices for that purpose.

Innovative Interdisciplinary Curricula

Meil (1965) stated that concerted efforts to organize the curriculum around psychological principles rather than the disciplines began at the turn of the century and intensified with the Progressives in the 1930's. The first attempts correlated subjects similar in content but maintained the subject identities. Then amalgamated studies evolved that disregarded subject lines, including such broad fields as social studies, general science and general mathematics. By the 1930's, units of work

thematically organized or problem-centered were popular. Teachers drew on subject matter as needed to solve problems or relate to a theme. At that point, the separate subject curriculum was in disrepute and interdisciplinary education was in vogue.

Obviously, modern educators have a valuable legacy from the Progressive era in the many innovative interdisciplinary models developed during the early twentieth century. Curricular approaches that were experimented with included the following:

Concentration

Correlation

Fusion

Broad Fields

Core Curriculum

These established many precedents for educators of the 1980's interested in interdisciplinary education.

Concentration

The National Herbart Society proposed a notion of concentration to unify the curriculum. All subjects were to blend into a core subject, and thereby become subordinated to phases or parts of one central subject.

Two examples of concentration were the Ziller Plan and the Parker Plan. The former dissolved all subjects into the cultural studies of history and literature. The curriculum was sequenced according to the principle of

cultural epochs, whereby parallels were drawn between the natural unfolding of the child and the significant stages of development evident in culture (Monroe, 1911). This was

the first attempt to treat the curriculum especially its sequence, upon other than conventional, or formal and logical grounds. (p. 241)

The Parker Plan assimilated all subjects into the sciences. Unification was predicated upon inherent philosophical relations among the sciences which reflected the unity of nature itself. Parker (1894) explained that all subjects could be synthesized through the interdependence of nature as revealed through universal scientific principles such as form and number.

Correlation

Correlation, another scheme from the early 1900's, proposed interrelationships among subjects to make lessons interesting and intelligible. Connections among studies were to aid comprehension by making subject matter more easily retained and of greater significance to the learner. Motivation and student interest became curriculum goals as lessons stressed connections with already known materials, application to social and student needs, and the cultivation of better thinking skills.

Monroe (1911, p. 210) discussed incidental correlation and systematic correlation. The former arose

naturally in the classroom as a "necessity of good teaching". For example,

if the teacher is giving a history lesson on the discovery of America by Columbus, and makes use of arithmetic, geometry, geography, natural history, literature and drawing as a means of developing interest in the class and giving a comprehensive notion of the event, she is employing (incidental) correlation.

The latter "requires a planning out of the whole course of study". It implies an arrangement to make various subjects relate to each other. For example,

the day's work in arithmetic is planned not merely to spring out the preceding lesson in arithmetic but also to be a natural outcome of the work which has just been done in geography, nature study, constructive work, or perhaps even history and literature.

The intent was to end the artificial separation of subjects, or as Weeks (1936, p. 5) declared, to establish points of contact between subjects to "effect educational synthesis".

Fusion

Fusion discarded subject boundaries, using problems as the structuring principle. Hatch and Stull (1926, p. 371) stated that a fused curriculum is composed of

various elements from history, geography, and civics, ... so welded or fused that distinctive lines are gone.

Subject matter must have a direct value to students who would confront problems corresponding to life situations and appealing to them, making subject boundaries hindrances to learning. All subjects would be centered

around an individual's search for personal meaning, demanding an interdependence of knowledge.

Broad Fields

Of course, not all courses were quite so idealistic in philosophy or intent. Some recombinations of subjects were mergings of allied disciplines into more comprehensive subject matter categories. Subjects frequently overlapped in concepts and skills, so for efficiency and convenience some content areas emphasized the broad similarities in these subjects, known as broad fields. The intent was simply to avoid repetition in the curriculum and make better use of classroom time. Nevertheless, this was an arrangement pattern that benefited students in that it exemplified interrelationships rather than the logical arrangement of the parent disciplines.

Core Curriculum

These curricular alternatives were given extensive attention in the 1930's and 1940's by the Eight Year Study and the Core curriculum movement. Both experimented with curricula that could involve students in exploring problem-solving techniques. Practical situations became the curriculum focus as adolescent needs were identified and projects created to meet these needs. Curricula were unified, as espoused by the Progressives, around

children's experiences and active involvement in civic affairs.

There was an obvious relationship between the emphasis on problem-solving and social concerns of the 1930's. Society was reeling from the disastrous influences of the depression years. Education was charged with preventing a recurrence, and schools were being visualized as instruments for social reconstruction, to counteract the "disintegrating tendencies of society" by focusing on persistent social problems (Smith, Stanley and Shores, 1957, p. 314).

The Progressives deemed an interdisciplinary approach essential to understanding the social crises and correcting the mentality that created them. Dewey's philosophy, and the curriculum it entailed, were readily seen as an opportunity to revamp the educational system to make it socially relevant.

The Core curriculum used Dewey's goals of reflective thinking and problem-solving as cornerstones. A curriculum was proposed that was a practical outcome of the Progressive philosophical orientation, the promptings of social concerns and the humanist demand for more relevant, meaningful education for young people.

Bossing (1964) described the Core curriculum as a natural logical outcome of experience centered learning. The basic question for Bossing (1955, p. 209) was:

What types of learning situations should the school attempt to set up to ensure that the pupil can have the types of learning experiences needed?

The answer was a curriculum based on the problem situations faced in everyday life, one that could not be limited to the arbitrary confines of traditional subject boundaries.

Thus adolescent needs, along with a social demand for informed citizens capable of solving problems, became the focal points of learning activities (Chiara, 1955). Courses existed on concerns such as "Living in the Atomic Age" (p. 426). Birkmaier (1955) challenged schools to confront critical issues and to develop broader social perspectives among students, as students used initiative, creativity and resourcefulness in solving realistic problems.

This approach was a significant departure from the conventional curriculum, a "quantum leap" beyond the subjects (Cohen, 1978, p. 132; Trump and Vars, 1976, p. 223). It started with student problems and reached out "for content and experiences that illuminate them" (Vars, 1982, p. 223). Whereas covert attempts to unify the curriculum merely involved changes in the subject structures, overt unification attempts exposed students to new structures for knowledge.

Administrative Precursors

Once subject boundaries were discarded, the retinue of support apparatus that had been developed to protect the subjects was threatened. The subject curriculum, in addition to being a tidy way to store and retrieve knowledge, was an efficient administrative and organizational device. Subjects became institutionalized. They were built into the very structure of secondary schools as unchallenged assumptions visible in buildings, time schedules, and staffing. All were inextricably tied to a long-forgotten social preoccupation with orderliness and efficiency that reflected the industrial priorities of the early 1900's.

The fixed schedule, teacher deployment practices and space utilization were administrative devices that grew with and maintained subject delineations. Students were confined to classrooms of uniform proportions - called "egg-crates" by Callahan (1977) - to function for a predetermined time allotment to absorb a predetermined amount of information presented by one teacher. Routines were well established by the school bell, often automated to ensure precision timing. Teachers were isolated according to subject expertise, a situation perpetuated by subject departments and classroom doors. In short, the school organization and administration served well the curricular and instructional needs of the school - the wholesale dispensing of compartmentalized knowledge.

The key administrative and organizational word for the Progressives, as illustrated by the Core movement, was "flexibility". Facilities, scheduling practices and teaching techniques were modified to accommodate the new curriculum. Organizational, structural and attitudinal support systems were critically examined and changed.

For example, proponents of the Core philosophy had a primary and immediate concern with teacher and student isolation and scheduling. The Core approach stressed team teaching and blocked schedules, even in its earliest experiments (Van Til, Vars and Lounsbury, 1967). In 1938, a Denver high school located 235 students in a separate wing of the school under a team of six teachers to plan and teach the curriculum. A block of time was allocated to reflect the need for uninterrupted learning. Core teaching, flexible teaming and scheduling practices became synonymous. The principles associated with Core teaching were soon incorporated into school building designs, effectively replacing classrooms with more functional, adaptable environments for teaching and learning. Many of these administrative changes support current interdisciplinary approaches in education.

Structure of the Disciplines Movement

Such experimentation was curtailed in the 1950's as educators were forced to respond to a new social concern.

Demonstrated Russian superiority in space technology prompted a countertrend to the Progressives and restored distinct subjects to renewed status. Education saw an attack on interdisciplinary methods. A return to the more basic, traditional curriculum was essential, in public opinion, to retain a superior, intellectual standard that had deteriorated in American secondary education.

Academics and subject matter specialists redesigned curriculum around the disciplines. School subjects were to reflect disciplinary lines as condensed versions of scholarly products from university research.

The leaders of the new movement were specialists. Schwab (1962) placed a new emphasis on the specialized concepts and inquiry processes of distinct disciplines. Bruner (1960) wanted students treated as miniature scholars, participating in the same discovery techniques and possessing the same, albeit less developed, skills as a specialist at the forefront of his discipline. The result was a series of prepackaged curricula emphasizing the major concepts, questions and frameworks within the disciplines.

All subjects were modelled on the structures of the disciplines. The learner was to be taught to "understand the structure of the discipline he is studying" (Neagley and Evans, 1967, p. 32). The intent was to inform students that all aspects of a discipline are related-

its body of concepts, its methods, and its style of inquiry.

As Sayler, Alexander and Lewis (1981) explained, each discipline consisted of a set of generalizations that bound its subject matter into a cohesive whole, guided investigation, set limits for new knowledge, and provided clues to help students discover these generalizations. The curriculum was designed to meet these criteria, with subject matter sequenced to suit the immature minds of students.

Fortunately for advocates of interdisciplinary education, as Foshay (1971) argued, the disciplinary movement shared some of the curricular aims of the Progressives. In fact, he concluded that

if one could take the subject matter as a mode of inquiry, then many of the problems that separated the two would disappear. (p. 136)

First, the learner was seen as an active participant in learning, utilizing inquiry-centered strategies to discover fundamental concepts from the disciplines. This mirrored Dewey's emphasis on utilization rather than consumption of knowledge. Rather than being presented with knowledge that, according to Schwab (1962, p. 201) "tended toward the shape of a catalogue", students were actively involved in an inquiry approach stressing patterns in subject matter. Learning depended on a student's ability to grasp the conceptual and syntactical structures of disciplines, the former being their data and

the latter their specialized ways of solving problems. Furthermore, these principles were better retained and transferred to other learning situations, a basic proposal from the Progressives.

Secondly, the disciplinary doctrine furthered the modernization of knowledge. It recognized the dynamic nature of knowledge and provided a means to accommodate new knowledge and delete obsolete knowledge. As Sayler, Alexander and Lewis (1981, p. 209) explained, the learner would be helped to

test out information, to answer questions, to inquire, to reconstruct his or her own knowledge and use it - in short, to develop his or her own intellectual powers.

In addition, the request for better content updated the disciplines, eliminated obsolete content, and

answered in part the question of how to deal with the explosion of knowledge by emphasizing processes of inquiry, generalizations and principles rather than amassing unrelated facts. (Van Til, 1978, p. 228)

This appeared to be an intellectually defensible case for Progressives to adopt aspects of the separate disciplines approach.

Finally, educational practices became consistent with what was known about learning and instruction. Certainly the emphasis on general aims, individual differences, discovery learning, the teacher as guide, and intrinsic motivation were endemic to both the disciplines doctrine and cognitive-field psychology (Hannum, 1983).

Gestalt psychology was replaced by cognitive-field theories of learning that emphasized the internal workings of the mind. Bigge and Hunt (1980, p. 533) thought that this psychology would appear viable to both traditionalists and Progressives because it

would restore an intellectual emphasis in education and at the same time provide a psychological basis for education free of the criticisms validly made of the old "mind training" approach.

Then too, Bruner's stress on intuitive thinking is similar to cognitive-field psychology's key term "insight" (Bruner, 1960). Reflective thinking and problem solving skills were to be taught democratically in classrooms dedicated to both the disciplinary doctrine and the new psychology. Obviously, as represented by Bruner's theory of instruction, the disciplinary movement stressed a more holistic view of the learning process advocated by modern psychology than had previous educational practices.

However, educational practices were still confined to the established disciplines. Phenix (1969) admitted that the curriculum was fragmented and irrelevant to students and society. Schwab (1969) stated that the disciplinary mode created the illusion that subjects were natural divisions in knowledge. Bruner (1971) acknowledged that the disciplinary movement had a naive faith in intrinsic motivation and that a more relevant curriculum would not take motivation for granted. He proposed a moratorium on further disciplinary projects. Foshay (1971, p. 351) saw

relevance as the missing element in the curriculum, because problems "do not come packaged in disciplines". All were previous champions of the disciplines doctrine.

Renewed Interdisciplinary Interest

Basically, the disciplinary movement lost its appeal as interest arose in social issues during the 1960's. Students protested the abstract nature of the curriculum and the remote, unrelated education they were exposed to. Relevance was the new social catchword. Furthermore, the promised advances in learning, particularly the transfer of skills and concepts across disciplines, did not materialize to educators' satisfaction. As Foshay (1971) predicted, and Callahan and Clark (1977) confirmed, the movement did not survive intact into the 1970's.

Dewey's instrumentalism, experience-based education, and reflective thinking were revitalized as curricular goals. Bigge and Hunt (1980) attributed this to the cognitive-field psychology. The individual utilized knowledge by relating it to purposes and situations he felt important. Purposeful, personal involvement through a problem-solving curriculum became the norm. Reflective thinking involved an emotional commitment to learning and generalizable problem solving skills. A curriculum was most relevant when it was individualized, focused on

adolescent and social needs, and centered in realistic, everyday activities.

The 1960's: A Decade of Innovation

The 1960's became a decade of innovative instructional methods and curriculum alternatives. As Bigge and Hunt (1980, p. 533) concluded, teaching that reflects psychological principles emerging from updated learning theory cannot be bound by tradition:

Real problems are psychological; data used in solving them are rarely organized in the same pattern as textbooks and courses of term.

Hence, courses should be

allowed to cut across subject lines whenever such deviation makes sense in terms of the particular problems being studied. (Ibid.)

Interdisciplinarity was in fashion again.

All the "bastions of traditional education" fell to the reformers of the 1960's (Duffy, 1974, p. 4). Ornstein (1982, pp. 27, 28) catalogued the following as our legacy from that period.

| | |
|---------------------|----------------------------|
| team teaching | individualized instruction |
| television | programmed instruction |
| flexible scheduling | differentiated staffing |
| resource centers | continuous progress |
| open space | |
| pass-fail | |
| non-grade | |

Furthermore, the trend in the subject areas was away from the disciplines and toward creative recombinations of subject matter to address social and personal concerns. Included were studies on topics such as environmental issues, ethnic problems, bicultural education, drug abuse, law and justice, consumer protection, and career and personal guidance. All were interdisciplinary by nature. Duffy (1974, p. 4) concluded that these developments were the vehicles to "pave the way for interdisciplinary efforts of the 1980's", because they proved that traditional organizational barriers to reform could be broken.

The 1980's: A Decade of Challenges

What about the secondary school of the 1980's? Current criticisms seem to indicate that the reforms of the past do not prevail in schools. Charges of fragmentation and irrelevance abound. Schools are "stuck with our old habits" (Sizer, 1983, p. 681). Formal learning is stressed rather than student experience and studies are "disembodied" (Gibbons, 1976, p. 54). The "academic grind" continues (Eisner, 1984, p. 3). An academic orientation has deteriorated modern education (Arnstine, 1983).

Also, teacher-dominated activities confined to classrooms and restrictive schedules continue. Teachers are "purveyors of knowledge" (Laskey and Alplegate, 1982,

p. 4). Factual information is stressed instead of synthesis. Critical thinking skills are ignored as teaching continues to stress objective facts as self-evident truths (Confrey, 1982). Subjects dominate the curriculum, along with their organizational and structural syndrome. Indeed, the school of the 1980's, in many respects varies little from the historical stereotype.

Not that there are no problems to challenge today's society. Hamsch and Vollman (1983, p. 12) listed these "big questions" facing mankind:

population explosion, environmental deterioration, world famine, poverty and disease, nuclear war, social and cultural erosion, group conflict at all levels (family, gang, class, nation), the loss of traditional human beliefs, and last, but not least, the violence and disharmony between individuals.

These exploding social problems are prompting new interdisciplinary approaches. They cannot be confined to disciplines, and cannot be understood without interdisciplinary analysis. Only an education that permits interrelationships among the disciplines to develop individuals with "breadth of vision" and ability to synthesize knowledge will adequately prepare mankind to face the future confidently in light of prevailing circumstances.

Conclusion

Modern requests for interdisciplinarity can be facilitated by the types of school curriculum and organization proposed and practiced by educators in the early twentieth century. Current theories of learning are renewals of concepts developed by the Progressives. The stress on knowledge as meaningful information rather than fact has historical precedent. The need to foster an interdependence among disciplines to relate to a complex world, and to eliminate inflexible teaching practices has long been recognized.

Modern educators constantly reiterate the need for an interdisciplinary vision in secondary education to alert students to the interdependence of knowledge when education addresses social concerns, and the necessity of building this vision into the structure of the total school curriculum. In fact, Core principles, representing educational ideas founded by the Progressives, are being increasingly utilized in the middle schools and secondary schools in the form of an interdisciplinary general education. Social concern is again being centered on the demand for coherence in the curriculum.

CHAPTER III

TOWARDS DEFINITION: A DIFFICULT PROCESS

Introduction

In interdisciplinarity we are in the midst of a transitional period, characterized by "great energy, creativity, imagination" (Conkright, 1982, p. 16). The classical curriculum of the eighteenth century, transformed into a competitive, discipline-centered curriculum of the nineteenth and twentieth centuries, is now maturing into an integrated curriculum of the twenty-first century. New initiatives under the banner of interdisciplinarity promise to deliver a curriculum with none of the alleged weaknesses of the former, and with the potential to satisfy most educational needs of the future.

Several factors must be examined in order to arrive at a defensible meaning for interdisciplinarity. These are prerequisites to adequate definition. They create a supporting network of information and name the criteria that need to be fulfilled in order to refine the key concept for precise comprehension.

The difficulties become more evident with a closer analysis of factors that directly or indirectly influence definition. The prominence of figurative language is one factor that can confuse the definition process. An examination of indiscriminate use of terminology will reveal other factors, such as a primary reliance on

practice for definition, and the use of "interdisciplinarity" as a general name for several distinct types. Each contributes to the difficulty in adequately defining terms.

Interdisciplinarity and Metaphor

Since figurative language is widely used in educational circles, it is not surprising that "much of the discussion in interdisciplinarity is based on metaphors" (Squires, 1975, p. 42). In fact, much talk about interdisciplinarity has been couched in terms of metaphor and analogy. This serves a purpose in defining terms, but undue reliance on such language can result in definitions that are vague and suspect. Obviously, an examination of figurative references in the area of interdisciplinarity is one prerequisite to adequate comprehension of terminology.

Interdisciplinarity, being a relatively new term, has been formulated and popularized in the literature through figurative expression, with metaphor and analogy utilized to experiment with the meanings of ideas and concepts that are assumed to be encompassed by the term.

Indiscriminate Terminology

A second prerequisite to adequate definition is an examination of the indiscriminate use of terms to categorize a variety of activities. Two factors

contribute to this dilemma: a primary reliance on educational practice for definition and the use of the term "interdisciplinarity" as a generic name for several distinct types.

The confusion over meaning emanates from disagreement over what one can classify as interdisciplinary. Often there is very little consistency or commonality, a problem highlighted by Newell and Green (1982, p. 24):

The term interdisciplinary studies itself is so loosely and so inconsistently used that almost any course which does not fit neatly within disciplinary departments is apt to be labelled interdisciplinary.

A complexity of practice identified as interdisciplinary simply adds to the perplexity of those interested in acceptable definition.

Definition by practice results in meanings determined by specific circumstances or by context. Other definitions attempt to avoid the specific by relying on the generic. In fact, "interdisciplinary" is most often used as an umbrella for all attempts to unify curricula. In its broadest application it is a generic concept, wearing many disguises which are subtly but significantly different. Both processes lead to indiscriminate use of the terms.

The Definition Process: An Illustration

Some insight into the problem of terminology is provided by an examination of the process whereby new concepts are discovered, discussed and labelled.

Langer (1957, preface) provided the basis for such an examination:

The process of philosophical thought moves typically from a first, inadequate but ardent apprehension of some novel idea, figuratively expressed, to more and more precise comprehension until language catches up to logical insight, the figure is dispensed with, and literal expression takes its place.

This can be utilized as the foundation for a philosophical analysis of the term interdisciplinarity.

Phelps (1985, p. 12) explained further:

Susanne Langer writes of the great generative ideas that periodically arise to transform our intellectual enterprises by changing the very terms in which we frame our questions and conceive our purposes. When one of these concepts bursts into consciousness, we cannot at first view it critically, because it is the nature of a key change to possess us with its compelling new vision of the world. For some time afterwards we are absorbed in exploiting the energizing, fertilizing power of the new idea, which seems limitless in its implications and applications. Only later, as the paradigm matures, can we begin to refine and correct its key concept and to achieve the critical distance necessary to recognize its bounds.

Interdisciplinarity is indeed one of the "great generative ideas".

The use of the term "interdisciplinarity" was limited prior to the later 1960's and early 1970's (The International Encyclopedia of Higher Education, 1977). It

is "a relatively recent addition to educational jargon" (Swora and Morrison, 1974, p. 46). Hausman (1979, p. 1) agreed that its meaning and functions "are of relatively recent origin". According to Squires (1975) the origins of the term are obscure, but it came into common currency in the 1960's.

What is certain, however, is that "inter-disciplinarity" soon outgrew its original meanings. Educational activities multiplied so quickly that it "became necessary to distinguish between disciplinary, inter-disciplinary, and pluri-disciplinary" (The International Encyclopedia of Higher Education, 1977, p. 2210). The term "trans-disciplinary" followed (Vroomman, 1972, p. 15). Subsequently, a series of prefixed labels emerged in the literature from learned societies and university scholars.

These were multi-, inter-, cross-, pluri-, and trans-disciplinary. The practice and theory identified by each was, at least initially, clearly delineated by a sponsoring group. The differentiated terminology encompassed activities that were potentially different and enabled theorists to "distinguish different degrees of overcoming disciplinary separation" (Jantsch, 1980, p. 305). Terms corresponded to degrees of interaction between disciplines. Thus, the first step was to make clear distinctions in interdisciplinarity.

The recent emergence of a new interdisciplinary vision provided an illustration of Langer's process, exemplifying the titillation generated by the discovery of new concepts as the result of a wave of renewed interest in interdisciplinarity. The new vision was a self-organizing paradigm which furthered the ultimate dream of arriving at a full synthesis of all knowledge.

Jantsch (1980, pp. 308, 309) was elated with a new transdisciplinary vision of the 1970's that had the potential to "transform our intellectual enterprises" and "possess us with its compelling new vision of the world". He demonstrated his fascination with the concept, which emerged from the general systems theory of the 1940's as a "new paradigm", a "new focus", a "new ordering principle", a "new view of dynamics" and a "new type of science".

Jantsch was infatuated with his new transdisciplinary vision as a revelation in response to age-old interests that have been revived. His excitement was tantamount to that of a child who had generated a novel idea or an insight:

This vision is no longer geared exclusively to the human level as ultimate reference, but is truly cosmic in scope. In the vision of an interconnected, dynamic universe, evolving as a whole, a new focus emerges for pulling together the physical and social sciences, the arts and the humanities, philosophy and knowledge transcending the rational domain; in short, the totality of human relations within the world. (p. 308)

He characterized the emerging idea as "a powerful pull on interdisciplinary synthesis" (p. 311).

Other writers shared the vision. Conkright (1982, p. 15) predicted renewed emphasis on "a new interdependence of all living forms". The search for connectedness was developing what Halliburton (1981, p. 463) called a "paradigm shift". Wolfe (1984, p. 29) concluded we were recapturing "from antiquity the idea of wholeness, the metaphysical idea that ruled our thinking before we adopted our modern method of truth seeking, dividing wholes and studying particles". Modern man was "opting for new-think" (p. 28), a variant of interdisciplinarity called transdisciplinarity.

Interdisciplinarity and Metaphor

Whether interdisciplinarity is discussed as a method, a way of thinking, or a process - all three of which are legitimate expressions - one can't escape the use of figurative language.

An array of metaphoric language attempts to convey the interaction of disciplines:

- "marriage of the disciplines" (Baer, 1976, p. 94)
- "interdisciplinary weddings" (Johnson, 1980, p. 59)
- "glue to cement subjects" (Gagg, 1983, p. 42)
- "interdisciplinary connections" (Boyer, 1982, p. 63)
- "insightful borrowing" (Sherif and Sherif, 1969, p. 205)
- "building bridges" (Hinden, 1984, p. 15)
- "informed connections" (Conkright, 1982, p. 2)

- "interdisciplinary bonds" (Fagan, 1976, p. 32)
- "networks of knowledge" (Heming, 1980, p. 13)
- "merging/mixing/synthesizing" (Seeberg, 1980, p. 33)
- "meshing the disciplines" (Melzer, 1980, p. 44)
- "finding the common denominator" (Wallace, 1980, p. 37)

Implied in each is a complex strategy for implementing interdisciplinary activities.

However, interdisciplinarity is more than methods for relating disciplines. The term is often linked with other words in nebulous phrases such as:

- interdisciplinary perspective (Fletcher, 1980)
- interdisciplinary point of view (Judy, 1980)
- interdisciplinary dimension (Marsh, 1968)
- interdisciplinary vision (Boyer, 1983)
- interdisciplinary view (Cluck, 1980)
- interdisciplinary attitude (Cohen, 1978)
- interdisciplinary mental outlook (Michaud, 1972)

In such contexts, interdisciplinarity supposedly fosters a person's mode of thought, his frame of reference, and his way of thinking to parallel the interaction of disciplines.

Furthermore, interdisciplinarity is a process and an approach to education. Analogy is a prevalent mode of explanation, as these illustrate:

In some ways, the traditional approach to education is like describing the parts of a watch and analyzing the structure and function of each part, without explaining the

interrelationships among the parts or how they fit together to create a functioning watch. Interdisciplinary studies are one way of organizing academic experience to begin putting knowledge back together again. (Garkovich, 1982, p. 152)

Again:

To deal with the broken up disciplinary sections of knowledge about such a holistic reality amounts to freezing the world and digging deep and narrow holes into the frozen ground, instead of looking at the stream of life with its processes and interactions, turbulent waters and emerging and vanishing vortices. Interdisciplinarity is an approach to partially unfreeze the world and interlink disciplinary holes. (Jantsch, 1980, p. 805)

And, finally:

The whole process reminds one of a building supply emporium. The stacks and piles of lumber, brick, block, and insulation gets bigger and bigger, analogous to the increase in the number of courses in math, science, social studies, and so on. What is missing is the builder or process whereby the components are brought together in a meaningful integrated structure. (Maley, 1984, p. 5)

This reliance on figurative expression begs answers to obvious questions. Why does the discussion on interdisciplinarity invite such extensive utilization of figurative language? How do metaphor and analogy hinder or facilitate attempts to define interdisciplinarity?

Metaphor's Generative Potential

The word metaphor is from the Greek word "metapherein" meaning "to transfer" (Mahood, 1984, p. 14). Implied is a transference of meaning from the known to the unknown. Therefore, metaphor can help in the discovery of

meaning by infusing new concepts, ideas, or words, with knowledge already existing.

Metaphor has a generative ability to provide insight into the new via the familiar. Black (1962, p. 236) recognized this creativity of metaphor when he discussed

its power to bring two separate domains into cognitive and emotional relations by using language directly appropriate to the one as a lens for seeing the other.

This potential for creation was also explained by Eisner (1975, p. 135) when he proposed extending the use of metaphor beyond its poetic boundaries:

Metaphor enables us to express the ineffable- it suggests or renders rather than describes. It penetrates the surface of qualities to illuminate their expressive content, then experiential meaning.

Expanding this idea, Mahood (1984) argued that metaphor sought to guide discovery and advance knowledge in the social sciences. Because of their ability to conceptualize abstractions, metaphors are tools for exploring, describing, interpreting or elucidating new situations. Recognizing metaphors as models to explain the world to students, he continued, they are "analogies that use concrete, familiar language symbolically, representing reality to discover and explain regularities" (p. 14).

Elbow (1971) explained the metaphor's inventiveness. The metaphor is the "source of originality in thought" (p. 129). "The real invention of concepts", he claimed, "is a process akin to metaphor using" (p. 127). Also,

behind the capacity for inventing new concepts is the more fundamental capacity that we call metaphoric or analogical ability: sensibility to functionality. (p. 132)

Thus a new idea, concept, or term is constructed or invented intuitively by means of a relationship between two given ideas, concepts or terms. Thereby one's grasp can exceed one's reach.

Metaphor presents an ideal strategy for inventing concepts and the terms to label them. This is the process of invention that Langer (1957, preface) envisaged:

Really new concepts, having no names in current language, always make their earliest appearance in metaphorical statements; therefore the beginning of any theoretical structure is inevitably marked by fantastic invention.

This is an acknowledgement of the importance of metaphor in initiating new ideas, in that the first understandings are figuratively expressed.

Thus, figurative language is prominent in descriptions of interdisciplinary activity, as writers strive to define a new term in language that is already known to their audiences. On the other hand, while one would be hard-pressed to negate the value of figurative language in creating new concepts, one would also be well advised to get a balanced perspective by considering any problems resulting from a reliance on metaphor for clear definition.

Limitations of Metaphoric Language

There are several limitations in the use of metaphor to define concepts. First one must try to prevent the inhibition of thought by undue patronage of figurative language.

Pilley (1959, p. 59) cautioned that "much of our thought and action is profoundly affected by the kinds of metaphor we use". To illustrate, he contrasted "boundaries of subjects" with "branches of knowledge", noting the different connotations of the two metaphors. The former implied a relationship among subjects that was analogous to countries on a map, in which the demarcations are highly visible, containing the territory legitimately belonging to a country. This metaphor suggests that knowledge is limited to the recognized subjects. The latter, his preference, served as "a reminder that all branches of knowledge are living, developing things, that spring from a common trunk".

This tendency to seize upon a metaphor and let it dominate is quite evident in educational terminology. Claiming that "we can fill in the gaps in our knowledge about theory of the learner with metaphors about children", Foshay (1982), inventoried some from history. The child was described as "flower", "enemy", "cog", "machine", "chameleon", "miniature adult", "mystery" (Freudian), "gentleman", and "reasoner". Each developed a following of adherents who used it to the virtual

exclusion of others. A philosophical orientation led to educational principles and methodology that tended to see the student not as he was, but as the metaphor made him.

Seeberg (1980, p. 34) explained that we all realize the valuable asset we possess in the ability to symbolize, but "we live in a symbolic environment that traps us to thought patterns difficult to break free of". Language is used quite effectively to help us to perceive reality, but it acts as "a filtering plate, screening us from reality", so that we tend to "see the world not as it is, but the way our words make it". Metaphors may indeed be "appropriate filters of our experiences" (Mahood, 1984, p. 14), but unwarranted reliance leads to myopia of vision.

The second but related problem with metaphoric language is its tendency to eulogize, using lofty words that easily camouflage thought and interfere with clear definition. For example, Fethe (1977, p. 96) detected a "quasi-religious attitude" toward the word "unity" that revealed little more than prejudice. Language is used as a personal expression of a faith and commitment to a philosophy that proselytizes in a manner equivalent to a religious experience.

Thus an aura of mysticism surrounds "interdisciplinarity", "integration", and "unity", giving them a fascination of their own. Pring (1971) concluded that "integration", often used synonymously with "interdisciplinarity", is accepted uncritically because it

has "an emotive meaning that dares anybody to challenge the educational aims" that it implies (p. 265).

Many such "passionate pleas" exist (Conkright, 1982). Radesh (1975, p. 227) asserted that talk about education is afflicted with faddish rhetoric:

to be "relevant" and "with it" is to intone "interdisciplinarity" along with a select group of other magical formulas...[and to use them] with proper reverence and grammatical nicety.

Wake (1976, p. 22) summarized accordingly:

This is an idea much influenced by emotion in which words carry special "messages" which make them immediately acceptable. Interdisciplinary study is frequently contrasted with the "fragmentation of the curriculum" that resulted from teaching through individual projects. One finds talk of "breaking down subject barriers" and one finds the word "specialization" being synonymous with single subject teaching. Before one knows where one is, the words "irrelevance" and "relevance" are being used. There is even talk of interdisciplinary work as a means of "rejuvenating" the secondary curriculum.

The problem is that figurative language facilitates the evaluative element of a topic at the expense of the critical, analytical element (Pring, 1973a). To use nomenclature such as "integrated", or "interdisciplinarity", is to use a word already saturated with approval: "To call a curriculum integrated is usually to recommend it" (p. 29).

Gibbons (1979) described the tendency to accept a concept, approach, term, or method as a worthwhile state of affairs without the necessary analysis. Certainly promises (Toombs, 1980) and dreams (Jantsch, 1980) cloud issues that demand realistic and thorough explication.

Otherwise, like interdisciplinarity, they usually find easy acceptance and nearly universal recognition.

These limitations of figurative language are, however, not meant to deny its potential value in defining interdisciplinarity. As Wallace (1980, p. 40) concluded, metaphor is indeed a kind of definition because it provides "an enlightening and expanding experience".

Moving Beyond Metaphor

There is an excitement that accompanies any intellectual breakthrough that, like all human emotion, demands expression. The human response is to visualize, to conceptualize, to give form to ideas through emotive, connotative language. When there exists no suitably "neutral" terminology, we use our most fundamental human ability, the power to compare, contrast, and invent. Metaphor adds a human element to terms, making them relevant, interesting, and concrete expressions of abstract theoretical constructs.

Langer (1957, preface) attributed to metaphor a poetic license that is essential to the "first, inadequate, but ardent apprehension of some novel idea, figuratively expressed". Thus, every society meets a new idea with its own concepts and its own fundamental ways of seeing things.

Nevertheless, Langer insisted that one must move from metaphor to more precise comprehension, until "language

catches up to logical insight, the figure is dispensed with, and literal expression takes its place". In other words, figurative language may hold sway in the initial stages, but one must move beyond metaphor at the opportune time to delineate more precise terminology. Only then can a definition be defended logically and critically without reference to emotion and whim. Then, perhaps interdisciplinarity will escape the charge that it is "sometimes a slogan, sometimes a goal, often a topic of controversy and always a concept that is defined in a personal way" (White, 1981, p. 1).

Indiscriminate Terminology

Educational terminology is rarely used with scientific precision. The term "interdisciplinarity" is no exception. Berger (1977, p. 3) mentioned the different and sometimes contradictory activities called interdisciplinary. Gozzer (1982) did not like the haphazard use of terms to describe programs. Squires (1975, p. 7) claimed that "in everyday usage the term interdisciplinarity is often applied to any course that goes beyond a single discipline".

Consequently, the term has been rendered close to useless because it means "so many things to the many who have adopted it as a quick label for their project or activity" (Salmon-Cox and Holzner, 1977, p. 1).

Crocker (Appendix A; Correspondence) agreed that "it is by no means clear that everybody means the same thing when he refers to interdisciplinary studies". Any further clarification of interdisciplinarity must be preceded by an analysis of other factors that contribute to the abuse and misuse of terminology.

A Reliance on Practice

Interdisciplinarity has a strong practical orientation. In fact, interdisciplinary study arises more from practical considerations than from theoretical necessity. Michaud (1972, p. 285) described interdisciplinarity as "not only a theoretical concept" but "also - and perhaps foremost - a practice".

The difficulty, of course, is that a reliance on practice will result in as many meanings of interdisciplinarity as there are practitioners of interdisciplinary activities. Definitions become idiosyncratic to the particular circumstances being described and depend on context for meaning. The vagaries of practice lead to definition to suit immediate needs.

Consequently, interdisciplinarity will remain a fine sounding term but "a concept still unclear" (Gozzer, 1982). The former is an encouragement for the proliferation of relatively unexamined practice under a slogan, while the latter is essentially an indictment against practice without clear theoretical justification.

For example, Ingram (1977, p. 20) described integration (a synonym for interdisciplinarity) as a set of educational practices

developed largely on the basis of teachers' dissatisfaction with the increasing fragmentation of the school curriculum, their unease about the dissociation of what is taught in school and what is experienced in life, their despair at the practical difficulties raised by the proliferation of knowledge....

Many different teaching approaches are labelled interdisciplinary, but all are motivated by the belief that "a full presentation of reality in the schools must be multi-dimensional" (Beck, 1980, p. 28).

Swoboda (1979, p. 49) reiterated that, although the area of terminology is a persistent difficulty,

amongst proponents of interdisciplinarity there is little dispute over the need for an alternative to the present organization and transmission of knowledge, which have become grouped, at least during the past century, mainly along disciplinary lines, involving the ever-greater fission of knowledge and its increasing specialization.

These alternatives surface as the multitude of activities that, legitimately or not, are categorized as interdisciplinary.

While each of these practices may have a unique rationale and a limited justification, the composite field of interdisciplinarity lacks an overall theoretical rationale. Ingram (1977, p. 20) saw the necessity of such a rationale for integration:

Such rationale would, for example, help to clarify what is meant by curriculum integration, its relationship to subject teaching, the forms

that it takes, the purposes that it serves, when and to whom it is applicable, and its repercussions on classroom teaching and school organization.

Burchell (1971, p. 79) stated that interdisciplinarity "runs a risk of shallowness" because of the general absence of a rationale. It needs focus and lacks thrust. A strong rationale could guard against such pitfalls. He continued:

A fully etched rationale is not solely confined to validation of interdisciplinary education; it further contains import for curricular decision-making. (p. 82)

The adequacy of a rationale could be tested by applying three criteria:

- (1) A precise delineation of interdisciplinary education;
- (2) A stipulation for placement of interdisciplinary education in the total configuration of schooling;
- (3) Inherent implications for learning outcomes. (p. 83)

This was essentially a call for a theoretical framework to guide interdisciplinary activities in a coherent manner. Duguet (1972, p. 71) warned that

one could get the impression that interdisciplinarity was merely a hodgepodge of elements, judging from the variety of activities which are called interdisciplinary, from the divergence or even contradiction between some of the concepts used. It would be tempting to throw out the very notion that there was any unity involved, and to suppose instead that it was a mere chance encounter made possible by ambiguous nomenclature.

Wondering whether interdisciplinarity was a concept or a controversial practice, he explained that the roots of the problem lay in definition in isolation of rationale:

At times we feel blithely free of the yoke of the narrow, mediocre practices of disciplinary methodologies and our own enthusiasm is increased by knowing that most of the experiments are relatively recent. The problem of the scientific meaning of interdisciplinary is almost never touched on. (p. 72)

Some educators are anxious to be in the forefront of innovation (Hausman, 1979). The rush to impress colleagues with new program leads some advocates, in their determination and zeal, to

actively try to impose nontraditional concepts on their colleagues. They believe that they must prove themselves. However, because they do not yet possess defining principles their opponents remain skeptical. (p. 3)

A reasonable conclusion might be that there is a direct relationship between misuse of terms and the absence of defining principles - both being consequences of the complexity of interdisciplinary practice.

Obviously, as Michaud (1972, p. 285) indicated, "we have a right to wonder what this practice actually consists of". Without some theorizing, any activity that aligns itself with the interdisciplinary philosophy is accepted unconditionally, becoming "self-justifying" (Ingram, 1977, p. 20).

Although interdisciplinarity is essentially a theoretical term, its theory has yet to be formulated (Michaud, 1972). Any explanation ought to be a

theoretical explanation, in order to overcome the limited vision of activity that usually exemplifies interdisciplinarity. Reference must be made to theoretical scaffolding, in order to define terms adequately. Then distinctions in practice could be highlighted and made meaningful.

The first theoretical problem is to define terms. This would define the parameters of interdisciplinary activity. Here one enters a great ideological debate, accompanied by the intellectual discussions that educational philosophers assume to be their forte. This preponderance of theorizing is not unforeseen, however, because interdisciplinarity is "an epistemologically naive concept" (Duguet, 1972, p. 72). It is not easily defined, even within the realm of philosophy, because it is a confusing concept encompassing "multi-various formulations" (Hamsch and Vollman, 1983, p. 17).

Therefore, some philosophizing is needed to overcome problems associated with definition in terms of practice. Philosophy forces questions on commonplace assumptions, requiring reflection on practice (Hills, 1978). This is necessary since slogans

and other such official pronouncements are not philosophies at all, because they lack the clarity, comprehensiveness and coherence which would in any significant way advance an understanding of education in any or all of its aspects. (p. 72)

Interdisciplinarity could benefit from such analysis.

Hills listed some philosophical considerations which could place a theoretical foundation under interdisciplinary practice.

- (1) How do we go about characterizing various activities as disciplines or nondisciplines?
- (2) How do disciplines differ among one another?
- (3) How, or in the light of what principles, does one adjudicate disputes arising among rival accounts of these matters? And, what is the status of these principles?
- (4) How, and with what justification, would we make this kind of interdisciplinary understanding available to youngsters in the course of their education?
- (5) On what basis might the disciplines be integrated, and to what ends, in educational circles?
- (6) How might disciplinary understanding of this order map on to students' nondisciplinary ways of viewing the world? (p. 80)

He concluded that only when these aspects of interdisciplinarity are adequately explained would the total picture emerge, rather than the "blotches of colour in varying degrees of vividness" that characterize much of the practice in interdisciplinarity (p. 72).

Philosophers theorize. Apostel (1972, p. 144) defined the philosopher as:

The person who, for every activity, asks - What is its function? What is its purpose? Does it have any? If a student or a scientist asks this question, must he not be able to see the whole of human activity and the whole of the valuational system of his society, in order to

localize his own action inside this totality, in order to see its meaning?

These are the minds trained in analytic endeavors to use the high degree of precision that is essential to their profession. The most useful delineations of interdisciplinarity seem to have come to education through the auspices of specialists in epistemology, the philosophy of knowledge. The impetus for clarification has come from professional, curious minds eager to detect subtleties of difference rather than commonalities of practice.

Thus philosophy attempts to provide the analysis, the clarification of concepts, the theoretical justification for models of interdisciplinarity, strategies of implementation, and the underlying principles to connect isolated practices. A philosophic competence is deemed necessary for anyone involved with value decisions in education, including interdisciplinarity (Champlin, 1969).

Unfortunately, philosophy is sometimes held in disrepute, because it is seen by educators as the rightful province of theorists in the forefront of intellectual debate. These comprise the intellectual community who regularly participate in seminars, conferences, and symposia to engage each other in debate that is meaningless to those who are not part of the "inner circle".

Burchell (1971, p. 82) summarized the educator's concerns with theoretical rationale:

An overly facile rationale not bonded to curricular decisions and issues may subvert the movement toward interdisciplinary education because of conceptual deficiency. Certainly a rationale can be faulted if it is randomly discursive or couched in loose, excessively abstract language.

First, rationale developed by philosophers tends to be either unwieldy, far removed from curricular decisions close to practice, or have an air of glibness to make its reasoning accessible to everybody. Secondly, philosophy may indeed prevent rather than facilitate interdisciplinary activity unless one realizes that theorists and practitioners are partners in the same enterprise. Both need to be recognized in relation to interdisciplinary activity.

Champlin (1969, p. 171) noted that the philosophy of education is "circumvented at those points in educational theorizing where its tools and concepts are singularly appropriate". A "benevolent indoctrination" substitutes: everyone has his own philosophy, creating a process of give and take in education. Thus interdisciplinary practice can be justified by personal whim and pragmatic necessity rather than by way of analysis of terms.

A consequence is that many educators appear defenseless when issues of first principles are raised in debate. There is no doubt that those who practice interdisciplinarity are placed on the defensive when asked to justify practice with reference to a clearly defined rationale.

However, one can readily find evidence that advocates of interdisciplinary practice purposefully avoid much theorizing. Toombs (1980) suggested that we move interdisciplinary discussion away from philosophical or psychological levels and place it in the arena of design to make it operational and pragmatic.

The wisdom is contained in the question: Why wait for theoretical justification when circumstances demand immediate answers? Smith (1982, p. 223) proposed that we "not wait for philosophical agreement on the nature of knowledge but use a teacher's own experiences to structure the curriculum". At that stage, curriculum design becomes merely a technical task.

Discussion on theory is occasionally useful, declared Warwick (1975, p. 16), but

it would be a sterile exercise to unify the curriculum of a school at a high level of abstraction without this influencing the actual content of the work or the methods employed in the classroom.

This fear of theory's apparent inability to guide classroom practice was explained by one of the foremost curriculum theorists. Schwab (1973) characterized the curriculum field as "moribund", crowded with theory. His proposal was to move curriculum discussion away from "abstract representations of curricular phenomena" and toward the practical situation (p. 208).

He wanted to make curriculum a matter of design by encouraging reflection and discussion among practising

teachers. Curricula decisions made by active communication among teachers would give priority to particular schools and particular teachers rather than to theory. Teachers provided with expertise could gain an increased sensitivity to important educational and curricular issues.

One is tempted to conclude that one does not necessarily have to understand the philosophical implications of curricular designs such as interdisciplinary projects. Rather, one leaves the theorizing to those who have the impetus and expertise to address such issues. This is the wisdom that motivates those who view interdisciplinarity as a design problem and not a philosophical problem.

The concept of interdisciplinarity would appear to be boxed into the proverbial corner. Practices need a theoretical foundation to validate and legitimize them as instances of interdisciplinarity, but any conceptualization emanating from theory and philosophy is hard-pressed to cope adequately with the complexity of interdisciplinary activity.

Interdisciplinarity is not "a simple matter of curriculum and even if it must necessarily be reflected in new curricula, it is something more" (Michaud, 1972, p. 281). Yet, the absence of agreement on the "something more" has resulted in a situation which, in itself, is "enough to engender considerable skepticism about the

legitimacy of our more pretentious interdisciplinary aspirations" (Broido, 1979, p. 244).

Broido (p. 244) postulated that a fundamental obstacle to understanding interdisciplinarity is the absence of a clear-cut methodology, consisting of:

an assortment of well-defined methods that can ensure that by following them one will be able to accomplish some significant interdisciplinary task.

There may be attitudes that prescribe what we ought to be looking for and approaches that narrow down the possibilities and suggest definite patterns, but these do not amount to a methodology.

All of the suggested approaches and attitudes cannot guide practice in all its infinite variations. He explained that

many of the tasks offered by any serious contender to the title of "interdisciplinary" will not and cannot admit of clear-cut methodology, and such tasks will therefore have to be accomplished with heuristic prescriptions, partially successful paradigms, and halfway hunches. In other words, the problems of interdisciplinarity will always require increasing ingenuity and creativity. (p. 245)

While some interdisciplinary tasks and how they should be performed can be clarified, this "in no way mandates that we should be able to provide algorithmic prescriptions that would guarantee the desired returns" (p. 246).

This situation is unavoidable in interdisciplinarity, because it is "conceptually transparent" but not "methodologically transparent":

A task is conceptually transparent when we understand clearly enough what its aim consists in, i.e., when we have a set of traits that conceptually characterizes what is to be accomplished. A task is methodologically transparent when we have a clear enough understanding of methods whereby it will be successfully accomplished. (p. 247)

So, the game of chess may be conceptually transparent, with a well defined set of rules, but it is certainly not methodologically transparent, as any good chess enthusiast would agree.

One solution to the dilemma may be to attempt to clarify the relationship that should exist between the theorist and the practitioner. Oliver (1978, p. 3) described an ideal partnership that would help to resolve the theory versus practice debate:

A curricular theorist is one who is always looking into the distant skies. A curriculum practitioner, on the other hand, is more concerned with realities down on the ground. Once in a while, he or she looks up when the word gets around that there is a new light in the sky. Will it be a guiding light or just a flashy meteor that soon will burn out? Now and then the theorist and the practitioner become a pair of curriculum star-gazers as they mutually find excitement in a new star.

Practice ought to involve an element of reflection to bridge these two seemingly opposed sides.

Some philosophers have accepted this challenge to discuss interdisciplinarity as both theory and practice. They provided clarifications of terms, as well as considered the more practical matters such as

implementation strategies, obstacles to practice, and program evaluation.

Michaud (1972) defined interdisciplinarity from both the theoretical and practical viewpoints. Recognizing that different approaches to definition are needed in theory and application, he outlined typology of interdisciplinarity to reflect procedures and techniques that are used as well as the intellectual aims that are pursued.

Apostel (1972) discussed interdisciplinary tools to make interdisciplinarity operational. He believed that a concern with knowledge could not be effective unless it could "come into contact with the knowledge producing process of the period" (p. 142). He analyzed interdisciplinary programs in light of the philosophical understandings generated by discussion among theorists and practitioners.

Similarly, Hamsch and Vollman (1983) catalogued definitions that reflected both practice and theory. One model, based on levels of interdisciplinarity, satisfied the need for a philosophical typology. The other, based on variations of interdisciplinary practice, assumed a problem solving stance that would have pleased the practitioner.

The levels distinguished between qualitative and quantitative aspects of interdisciplinarity. The first identified the degree of influence exerted by disciplines

in the cooperative process. The quality of the relationship was determined by the amount of influence any discipline could maintain over the others. A balance of influence characterized a high quality relationship. The second aspect meant the scope of disciplines involved in the interdisciplinary transaction, or, in other words, the numbers and types of disciplines brought to bear in any type of interdisciplinarity.

There were five levels of interdisciplinarity:

- (1) Multidisciplinarity provided no communication among the disciplines. The degree of influence was minimal and the scope was, potentially at least, all encompassing.
- (2) Crossdisciplinarity involved one discipline holding a dominating role over all others in the transaction. Influence was maximized, but distorted to serve the dominant discipline. The scope was limited to disciplines that could contribute to the major discipline.
- (3) Pluridisciplinarity afforded only sporadic communication and irregular contact among disciplines. Both influence and scope were indeterminate and varying.
- (4) Interdisciplinarity upheld a balance of communication among disciplines, with both qualitative and quantitative aspects proportionately balanced in the relationship.
- (5) Transdisciplinarity provided an optimum of cross contact and cross communication among disciplines. A complete balance of influence was facilitated by a synthesis of all knowledge on an idealized plateau by a unifying principle separate from the disciplines.

The intent of this model was to reveal the theoretical nature of interdisciplinarity.

The variations, on the other hand, were proposed as implementation strategies for interdisciplinary activities. Four organizational patterns revealed interdisciplinarity in action.

- (1) Interdisciplinarity of neighbouring disciplines occurred when overlap necessitated that disciplines contribute either methods or concepts to a common cause. An example is the field of biochemistry.
- (2) Interdisciplinarity of problems was needed when specified problems could not be included in any one discipline. Collaboration was necessary since all aspects of the problem could not be addressed by isolated disciplines.
- (3) Interdisciplinarity of methods occurred when methods peculiar to one discipline were used for purposes of research and study in other disciplines.
- (4) Interdisciplinarity of concepts resulted when concepts developed in one discipline either overlapped or supplemented development of concepts in another discipline.

Each provided both the rationale and the organizational scheme for interdisciplinary activity.

Both the levels and the variations were necessary to define adequately the concept of interdisciplinarity. The theoretical functioned to analyze terminology, and practice served to give credence to the concept.

Generic Terminology

One must acknowledge the propensity for general terms in discussion on interdisciplinarity. "I occasionally use the word in a generic sense, as I trust the context will make clear", admitted Scott (1979, p. 307).

He further explained that difficulties were inevitable due to the "continued use of the term interdisciplinary as a genus to refer to a number of distinguishable activities" (p. 311). It was "frequently used as a genus for which other terms stand as species" (p. 307).

Of course, educators implementing interdisciplinary activities do not usually find it necessary to use terms so carefully as scholars and researchers. Although terms have been developed specifically by those who need precision in their language, such extensive analysis in no way guarantees the type of enlightenment that will guide practice. Disagreement among philosophers and curriculum scholars limits legitimate use of distinct terms. Precision is often restricted to an intellectual circle, while in everyday language, the more all-encompassing term is prevalent.

Furthermore, as previously discussed, any attempt to define interdisciplinarity cannot give a "clear enough understanding of methods whereby it will be successfully accomplished" (Broido, 1979, p. 245). Little wonder that Swoboda (1979, p. 51) concluded:

Even given the possibility of agreement on basic conceptual issues, the implementation of any form of interdisciplinarity will almost inevitably encounter serious obstacles.

Given these realities, one can better understand the impulse to generalize.

Another factor that encourages generic terminology is the apparent simplicity of the term interdisciplinarity. Definitions often correspond to the etymology of the term. McGrath (1978) suggested that "inter" means between or among, and "disciplinary" implies two or more studies. So, interdisciplinarity is defined as involving "two or more academic, scientific or artistic disciplines" (Webster's Ninth New Collegiate Dictionary, 1984, p. 630) - as "an approach to teaching and learning which draws upon the content and methodology of more than one discipline" (Underhill and Telford, 1980, p. 119). The former suggests nothing, while the latter contains some clues to help the reader see an interdependence between the content and methods of separate disciplines.

Two additional examples illustrate the customary use of the term. Interdisciplinary studies "organize learning in a way that leads to a relatedness of the disciplines and their distinct methods of enquiry and verification" (Batts, 1985, p. 2633). Involved is an organization of studies to show a relatedness, supposedly using methods as the organizing principle. Surely more details are required if such a definition is to be of any practical use.

What may be the best example of a definition intended to enlighten all interested parties is offered by The International Encyclopedia of Higher Education (1977). Interdisciplinarity is

the interaction between two or more disciplines related or unrelated, through teaching or research programs, for the purpose of integrating or coordinating concepts, methods and conclusions. (p. 2209)

This compendium is commendable, but each idea contained therein begs definition by itself.

Many definitions merely imply meanings and suggest purposes or methods. They appear to be deliberately vague and naive. Perhaps this is understandable, given the reluctance to define theoretically and the incapacity of theory to focus and clarify practice.

Just as reliance on practice has resulted in limited attention to theory, so reliance on universal definitions results in the oversight of practical considerations.

An obvious consideration is the obstacle to effective communication that disagreement on terms poses. How is dialogue possible without an understanding of terminology? In effect, definitions have been developed to guide discussion among groups. The adoption of a specific set of definitions is usually deemed essential so that participants can talk with each other on common ground.

Duguet (1972), emerging from a major European conference that focused world attention on interdisciplinarity, noted the merit of prior agreement on

the meanings of terms. Preliminary agreement "cleared up these problems of terminology considerably and paved the way for epistemological thinking" (p. 11). Organizers were determined to limit discussion and to avoid "possible misunderstanding stemming from nomenclature" (p. 15).

Likewise, a symposium sponsored by UNESCO and conducted by the European Centre for Higher Education in 1983, to examine interdisciplinary issues, relied primarily on UNESCO's official definitions for purpose of discussion (Hamsch and Vollman, 1983). While participants agreed on definitions, alternative proposals were still presented for some consideration.

Generic definition interferes with productive dialogue; disagreement on specific meanings of terms confuses attempts to get reliable information. The difficulty in researching interdisciplinary activity is compounded by varied practice and varied nomenclature, but especially by the perspective one takes regarding the generic nature of the term.

For example, a definition suitable to one aspect of interdisciplinarity or a specific activity overlooks other aspects and thereby limits conversation. Interdisciplinarity is always something less or something more than what was being discussed. On the one hand, restrictive definition confuses more than enlightens conversations. On the other hand, simply intoning

"interdisciplinarity" causes puzzlement and requests for clarification before proceeding.

A feasible approach is to compromise. The writer provided definitions that were qualified by explanations and suggestions for practical consideration. The generic term was most useful to explain the nature of interdisciplinarity in all its aspects, but references were made to the multitude of practices, approaches and methods to give enough leverage to prompt responses.

All of the writer's requests for information explained his intent, defined interdisciplinarity, and structured any conversation (or written response) around specific questions (Appendix A: Correspondence). The letter was a convenient way to structure an interview or written response to provide useful answers to specific questions, clarification on specific aspects of programs, and avenues for some speculation on the topic.

Interdisciplinarity was defined in its broadest scope, involving a great variety of efforts to interrelate school subjects.

To illustrate, interdisciplinarity was

any effort to interrelate school subjects to improve the learning opportunities for students by overcoming inherent weaknesses in the present subject-dominated curriculum and its accompanying pedagogy.

Of course, the concept of interdisciplinarity involves a great variety of such efforts at linking subjects, ranging in scope from simple juxtaposition of subjects around a theme or problem, to complete integration of concepts and methods.

(Appendix A: Letter to Professor R. Crocker,
November 14, 1985)

Again:

interdisciplinarity includes all efforts to interrelate school subjects, ranging from occasional references such as an history teacher might make to literature, to a thematic approach, drawing concepts as needed from subjects, to the ultimate integration of concepts and methods from two or more disciplines.

(Appendix A: Letter to Dr. M. Vokey,
December 3, 1985)

And finally:

interdisciplinarity includes all efforts to unify or interrelate school subjects with the intent of improving learning opportunities for students. The goal is both to overcome alleged weaknesses in subject-centered curriculum and to change teaching strategies in the classroom to complement new programming. For example, English and History could be correlated or coordinated to highlight the historical context of literature. Or concepts, skills and methods of one subject could be used to enrich, illuminate and clarify another subject. Or several subjects could be juxtaposed around a theme, topic or problem to broaden student's perspectives. Or concepts could be "fused" to create a new subject, a new discipline - the true integration of concepts into a "hybrid" subject such as biochemistry.

(Appendix A: Letter to Mr. James Crewe,
January 9, 1986)

While all respondents recognized the comprehensiveness of the term, reaction to the writer's choice of words varied from approval to disapproval. As

expected, those with considerable background and expertise in curriculum matters were somewhat cautious, preferring more precision in defining interdisciplinarity.

One expressed a professional preference for "integration" as more descriptive of interdisciplinary activity (Interview with Dr. Brown, Director of Instruction, Department of Education, November 21, 1985). Again, relying on the inclination to choose one's own preferences, the social studies consultant with the Department used "resource-based teaching" (Interview with Mrs. Smita Joshi, January 13, 1986).

Those with an orientation towards research preferred more precise terms, since vagueness impedes progress when one enters the realm of abstract research (Interview with Professor R. Crocker, Director, Institute for Educational Research and Development, November 14, 1985).

On the other hand, those concerned with developing and implementing social studies programs at a school level interpreted interdisciplinarity in terms of materials and teaching strategies utilized in the classroom (Interview with Mr. James Crewe, Social Studies Co-ordinator, January 20, 1986). Mr. Crewe, also an author of social studies textbooks, thought it important that the interdisciplinary perspective be built into any texts and support materials provided to teachers. Terminology obviously reflected professional biases and perspectives determined by people's backgrounds and expertise in curriculum matters.

By way of comparison, several respondents were more inclined towards less precision in discussing interdisciplinary activities. Teachers, for example, did not seem ill at ease with interdisciplinarity, and indeed recognized the teaching approaches they were using as instances of the same. One used an interdisciplinary approach to teach and reinforce mathematical concepts by having students use artistic designs and patterns (Appendix A: Letter to Mr. Clarence White, November 16, 1985; Response, December 18, 1985). In his opinion, a similar teaching technique would be applicable to many subjects.

In fact, teachers often used interdisciplinary activities in the normal course of their teaching. Another respondent used art work to illustrate scientific concepts (Appendix A: Letter to Mr. Brian Stewart, November 5, 1985; Response, January 4, 1986). Students completed model-building projects as three-dimensional representations of the DNA molecule. The teacher felt that if students could interact personally with the concepts they would better grasp the more abstract, difficult concepts in biology. He continued by speculating on other such projects that are possible, since science "actually overlaps nearly every other discipline there is (e.g., history, math, philosophy, psychology, theology, geography, and of course, language arts)".

These two teachers were not terribly concerned that interdisciplinarity covered a whole gamut of practice, since each related the concept to his own classroom experiences. Apparently only those removed from the classroom express some concern over the generality of terminology.

However, any comprehensive attempt at implementation is still a controversial and difficult process. Connelly and Clark (Hamsch and Vollman, 1983, p. 77) agreed:

Unfortunately, with its multiple definition, interdisciplinarity in education confuses and poses problems for administrators attempting to implement new approaches.

Therefore, the third practical consideration that needs attention because of the use of generic terms in interdisciplinarity is the difficulty with implementation.

Hausman (1979, p. 9) stated simply that "how one interprets the term is important to the kind of interdisciplinary organization or program one may envisage". Interdisciplinarity has many different connotations, each allied with different kinds of activities. Thus implementation becomes difficult unless some agreement is reached on definition.

One concern is that the success or failure of interdisciplinarity is often determined by the success or failure of specific variants of interdisciplinarity instead of the total scenario. As Burchell (1971, p. 82) cautioned, "the failure to explicate what is construed to be interdisciplinary study renders virtually meaningless a

rationale for interdisciplinary education". A vocabulary to clarify distinctions in interdisciplinary activity was essential to permit more precise delineation of interdisciplinary education.

Scott (1979) maintained that interdisciplinarity was plagued with misunderstandings about terminology because terms that seemed transparent were frequently used with differences that proved to be substantial. Without an awareness of this predicament, states finding promise in one interdisciplinary activity, or endorsing one interdisciplinary practice, have a tendency to approve all. Or, all is condemned by the failure of one.

This was a primary concern of Kocklemans (1979). He called for a more carefully defined terminology to reserve a label for each legitimate interdisciplinary activity, thereby identifying each to ensure that

it will be easier to examine each of the proposals on its own merits. Then if the debate about interdisciplinarity were to end up negatively in one particular area, it would no longer be legitimate to generalize and to declare all forms of interdisciplinarity impossible or meaningless. (p. 123)

Furthermore, if one assumed that he could make a legitimate point for one particular type of interdisciplinarity,

it does not follow from this that everything suggested under the general level of interdisciplinarity will be justified by this fact alone. (p. 124)

His conclusion was that those who defend interdisciplinarity on the basis of one variety of

activity, and enthusiastically advance this limited justification for all such activity, "have done much damage to all legitimate claims that can be made about interdisciplinarity issues" (p. 125).

Understandably, those with the greatest need for clarification were the first to supply terminology. Specialists in higher education, scholars in the forefront of their professions, and researchers in the area of epistemology and social concerns combined their talents to define interdisciplinarity. A combination of intellectual curiosity and practical necessity saw the evolution of several families of related terms to cover the entire field of interdisciplinarity.

First, but foremost, theorists have distinguished between interdisciplinarity in its broad sense and in its restricted sense (Kocklemans, 1979; Piaget, 1972a). Kocklemans defined interdisciplinarity in the limited sense as "efforts geared towards the constitution of a new discipline whose field of study lies between the other two disciplines already in existence" (p. 124). Piaget chose to use interdisciplinarity in the strict sense because it furthered his research interests in epistemology. An inclusive term made such analysis impossible.

Secondly, categories were created to identify the principal types of interdisciplinarity as "cognitive stencils to locate particular varieties of courses or nomenclature" (Ingram, 1977, p. 26). They had their best

use in planning and evaluating interdisciplinary practice. They ranged from the simple to the complex, but each served a distinct purpose.

For example, Eason (1981, p. 320) decided, for organizational purposes, to divide interdisciplinarity into inter disciplinarity and intra disciplinarity:

The first refers, in my taxonomy, to exploring significant relationships between or among unrelated disciplines, while the latter illuminates one particular discipline by the infusion of information from closely related disciplines.

These two broad types of interdisciplinary activities were deemed inadequate. More complex terminology was devised (Apostel, 1972; Kockleman, 1979; Hamsch and Vollman, 1983). Unfortunately, even these lacked universal acceptance.

Definitions bore the stamp of legitimacy for particular purposes. They did not gain universal recognition because they were identified with the original intent of the definitions. Thus, the definitions associated with a conference were shadowed by the time, place, and circumstances of that event. They lacked the comprehensiveness demanded by scholars not party to the discussion. Phrases such as "most frequently used definitions" and "official definitions" raised objections because they related to definitions devised to fulfill the mandate.

As an example, Meeth (1978) developed his definitions specifically as a basis for selecting programs to include in a magazine issue devoted to interdisciplinarity. He recognized that they were as arbitrary as others from the past, but accepted them as "universal in that they apply to all programs that go beyond a single discipline" (p. 10). They had the advantage of having been applied on a broad scale and shared with many educators who contributed to their refinement. But definitions derived from conferences claimed the same achievement. Those not contributing to these definitions had no reason to agree with them.

Thus the specialists themselves disagreed. There still existed "considerable confusion over the use of terms such as multidisciplinary, interdisciplinary, and transdisciplinary" (Jantsch, 1980, p. 305).

Kocklemans (1979), concerned about dogmatic definitions, refuted previous definitions. He decided not to affiliate himself with previous authors because their definitions emerged from a particular orientation that was not necessarily shared by others. He referred especially to the taxonomies developed by Heckhausen (1972), Piaget (1970, 1972a), or Jantsch (1972a, 1972b, 1980) as not suitable for universal agreement.

Heckhausen differentiated six types of interdisciplinarity on the basis of distinctions made among disciplines. The disciplines involved in

interdisciplinarity shared the same material field or the usual subject attributed to a discipline, e.g., plants with botany and animals with zoology.

Piaget's definitions were derived from his theoretical discourse on structuralism. Interdisciplinarity resulted from a search for structures deeper than phenomena and designed to explain them. The cooperation of disciplines led to actual interactions, resulting in mutual enrichment. He saw biology as characterizing a particular type of interdisciplinarity because of its ability to link the natural and social sciences through its structure. In fact, structures developed naturally, independently of human and social purposes as the sciences evolved. A vision of wholeness subordinated elements to the relations surrounding them, and conceived the whole as the product of these formative interactions. This philosophical analysis of knowledge resulted in types of interdisciplinary relationships.

Jantsch's definitions, on the other hand, were based on a systems approach to education. Accordingly, interdisciplinarity becomes an hierarchy of interactions, with coordination on the basis of "a generalized axiomatics and an emerging epistemological pattern (1972b, p. 15). Since the pattern acknowledged an extricately interconnected reality, the quest for knowledge had to assume a form of "interaction between living systems and their environment" (1980, p. 304). Thus a living

structure evolved that was process oriented, and that operated according to principles of self organization and self regulation. This was interdisciplinarity as "purposeful human activity". Jantsch's definitions reflected this sociological bent, as contrasted with Piaget's epistemological perspective.

Kocklemans (1979, p. 126) questioned these assumptions regarding disciplines and the terminology developed:

These authors presuppose either a certain conception of structuralism or genetic epistemology, or a general systems theory on the basis of which they try to clarify and justify the necessary distinctions. Since both structuralism and general systems theory have limited applicability only, and the philosophical assumptions underlying these positions are not universally accepted, it seems again unlikely that all interdisciplinarians will be comfortable with the suggestions made by these authors.

The forms of interdisciplinarity are various and controversial. Even with such concerted efforts to define the terminology, the practitioner is left to his own devices when he attempts to implement interdisciplinary activities.

Conclusion

Definition is a fundamental issue to interdisciplinarity. It becomes "an indispensable prerequisite for clarity of thought" (Margenau, 1972, Preface). Indiscriminate use of terms in both practice

and theory has been one of the incentives promoting educators and researchers to formulate more precise terminology.

Difficulties arise from the limitations of defining terms on the basis of practice or vested interests. Because definitions predicated on practice or philosophical orientations ran quickly into charges of conflict of interest, one typology became as good as another.

At best, generic terminology gives sufficient insight into interdisciplinarity to illuminate specific activities. Although definition is often a matter of personal preference, informed judgement, and educated guesswork, all variants in practice cohere into the comprehensive definitions used. What is more, precise definition can emerge from understanding the term in its broadest application, when the need arises, particularly in dialogue. One can conclude that communication about interdisciplinarity is possible, provided definition, whether broadly or narrowly defined, includes sufficient elaboration to clue the reader to possible meaning, even in the absence of precision.

Meeth (1978) located distinct types of interdisciplinary activity on an interdisciplinary pyramid. He realized that most programs involved combinations of classes: "few programs fit neatly into any one of the classifications" (p. 10). Many combined

the elements of all types. Thus, as Mayville (1978, p. 11) concluded, "the elements of Meeth's multi-conceptual pyramid do commingle under the quasigeneric term interdisciplinarity".

Ingram (1977) issued a similar caveat to those who tended to see his typology as a listing of all possible variations of integration. He explained the ubiquity of types that

exist only in the minds of men. When embodied in action they lose their identities and live a kind of symbiotic existence anywhere and everywhere, and often in the most unlikely places. Action may not kill types but it ruins their autonomy. Consequently, the divisions which have been drawn on paper do not really exist in the classroom, for every teacher in action employs more than one of them, and often many simultaneously. (p. 42)

Practice refuses to mould itself to any one of the types catalogued in interdisciplinary taxonomies. These need to be seen as idealized versions that do not necessarily mirror the varieties of activity flourishing among educators and researchers. Many of the approaches to unify subjects in school curriculum contribute to more than one of the categories. The most one could hope from definitions was that they would "help the teacher identify those that he either wishes to escape from or to emulate" (Ingram, 1977, p. 42).

CHAPTER IV

AN INTERDISCIPLINARY TYPOLOGY

Blum (1985) identified two dimensions of integration: scope and intensity. Scope means the range of disciplines and fields of study from which content is used, and intensity means the degrees to which the subject matter has been integrated.

Blum was developing an integration matrix to describe and compare integrated curricula. He admitted, however, that the terms "integrated" and "interdisciplinary" are used synonymously. Therefore, his terms may be used to characterize interdisciplinarity as well as integration.

The two dimensions will facilitate discussion on these terms: multi-disciplinarity, pluri-disciplinarity, cross-disciplinarity, inter-disciplinarity, and trans-disciplinarity. These will be compared and contrasted on the basis of their scope and intensity in an interdisciplinary typology. The terms are arranged in the order in which most typologies place them, indicating that each successive term is broader in scope and higher in intensity than the previous.

Two Dimensions: Scope and Intensity

Scope indicates a widening sphere of influence, from a specific relationship to the widest possible

relationship among the sciences and the humanities. The effort needed to integrate disciplinary contributions parallels the scope of the relationship.

Scope does not mean the number of disciplines in the relationship but the range of disciplines that can be potentially integrated in the interdisciplinary enterprise. Actually, any number of disciplines could be accommodated by any one of the terms to be discussed, but the range of disciplines that can be synthesized depends on the term. Ultimately, the scope can include all disciplines and fields of study known to man.

Complementing the scope of a relationship is the intensity of a relationship. Intensity indicates the degree of interaction among the disciplines. The degree of integration ranges from coordination to combination and amalgamation. The first refers to independent programs taught simultaneously and influenced by a common agency. The second implies taking chapters and units from disciplines and organizing them around some heading or principle. The last is "true integration", in that an interdisciplinary issue or topic forms the unifying principle.

In a sense, both scope and intensity are correlated. They intersect and supplement each other. The range of disciplines that can be integrated broadens considerably from multi-disciplinarity to trans-disciplinarity. And

the degree of influence that disciplines exert on each other in an interaction increases.

Multidisciplinarity

Multidisciplinarity is the least developed form of interdisciplinarity, having only "potential for future connections" (Hamsch and Vollman, 1983, p. 22). Indeed it is merely a new label for an old practice in that it entails "exposure to several bounded fields of study" (Radesh, 1975, p. 228). There is "no effort to lessen the importance of disciplines" (Blishen, 1970, p. 389). Instead, the established disciplines are recognised and utilized in curriculum organization that varies very little from the traditional disciplinary approach to education and research.

Involved is the juxtaposition of disciplines and subjects. The disciplines may be grouped around some problem or theme, but there are no apparent efforts to interrelate concepts, skills or methods from the disciplines. There is no attempt at synthesis (Jantsch, 1980). Involved are

several disciplines focused on one problem or issue - the juxtapositioning of disciplines, each of which offers a different perspective on a common question or theme. Each discipline contributes its own knowledge or approach to the theme, with no attempt to integrate or interrelate ideas. (Meeth, 1978, p. 10)

There is no effort to reveal any interrelationship that might exist among the disciplines. Jantsch (1972a, p. 107) described such as "the purposeless grouping of rigid disciplinary modules". Multidisciplinarity is a relatively simplistic arrangement of disciplines because there are no apparent connections.

It results in "combined disciplinary provinces - a sequential consideration - but these separate disciplines never intersect" (Cluck, 1980, p. 68). Or, it is a parallel approach in that "the disciplines remain discrete entities" (Unruh, 1975, p. 148). It is also an "additive conception" (Radesh, 1975, p. 228). All imply that "the disciplines work independently and some organizational structure puts the results together" (Salmon-Cox and Holzner, 1977, p. 2). The components are joined externally through appropriate linkages.

There are many such linkages that facilitate the multidisciplinary approach. The disciplines are simply employed in different formats to examine problems, topics, or themes, but they do so from their own separate perspectives. The disciplines are offered simultaneously without any effort to note interrelationships among them. Thus a multidisciplinary activity occurs when

the solution to the problem makes it necessary to obtain information from two or more sciences or sectors of knowledge without the disciplines drawn on thereby being changed or enriched. (Piaget, 1972a, p. 136)

Multidisciplinarity, in any form, engenders isolation among disciplines.

In that sense, the multidisciplinary approach makes little progress towards interdisciplinary relationships. It is an artificial organizational scheme imposed upon established disciplines without any genuine interdisciplinary contact. Berger (1977, p. 4) decided to drop the term altogether from his list of terms, because it "implied a dangerous dichotomy between disciplines", with each out to protect its own integrity at the expense of interaction.

Furthermore, as Meeth (1978, p. 10) cautioned, any such activity requires "the student to do the integrating". Too often students are left to discover the links themselves. This is not a valid assumption because, in fact, the best structured interdisciplinary activities teach students how, recognizing that integration is not a natural ability.

Radesh (1975, p. 228) thought that educators were somewhat irresponsible to leave the "integration and coherence of inquiry in the hands of those who are least prepared to undertake it", suggesting "an implicit pedagogy, a rather naive psychology and an irresponsible academic ethic". This was the essential problem that multidisciplinary activity posed.

Boyer (1983, p. 240), discussing American high school programs, made the point that

faculty and students will not derive from a list of disjointed courses a coherent curriculum revealing the necessary interdependence of knowledge. Even the best college students are unable to do so unless it is built into the very structure of the total curriculum.

Thus Newell and Green (1982, p. 24) were prompted to charge that multidisciplinary proposals

ignore the condition that interdisciplinary studies involve an integration of disciplinary insights. They appear to believe that any time two or more disciplines impinge upon a particular subject matter, or are brought together in a single context, the result must be interdisciplinary.

They present the disciplines in "serial fashion" without any attempt at synthesis. Consequently, they are often labelled interdisciplinary "more out of ignorance than ideological conviction".

Therefore, both of the dimensions identified by Blum as characteristic of interdisciplinarity are minimized in multidisciplinary. Scope is limited to juxtaposition with no effort to integrate or interrelate. In essence, there is no relationship, so scope is nonexistent as a factor. Intensity is also minimal, merely bordering on coordination, with independent programs taught simultaneously and influenced by a common agency. Such influence is restricted to any organizational structure that determines the selection of disciplines to be represented in that particular endeavor.

Pluridisciplinarity

Pluridisciplinarity also means the juxtaposition of disciplines. Again it implies the

association of disciplines to a common end, with no appreciable modification in a particular approach and methods of each discipline. (Hamsch and Vollman, 1983, p. 21)

However, whereas multidisciplinarity denotes the "purposeless grouping of disciplines", pluridisciplinarity denotes the "purposeful grouping of disciplines" (Jantsch, 1972a, p. 107). The latter involves disciplines that are more or less related. It is "a juxtaposition of two or more related disciplines with some methodological cooperation" (Swora and Morrison, 1974, p. 48).

Voskamp (Hamsch and Vollman, 1983, p. 24) chose the name "interdisciplinarity of neighbouring disciplines" to describe "an overlap to which both disciplines can contribute both methods and concepts". Kocklemans (1979, p. 127) stated that the term

implies such juxtaposition of different disciplines that the competence on one discipline presupposes a rather thorough knowledge of other disciplines.

This describes a relationship to permit sufficient interaction of concepts, skills and methods of disciplines to facilitate any work among related disciplines.

Obviously, this is a step removed from multidisciplinarity. However, cooperation is not always accompanied by coordination. In essence, the disciplines remain as isolated as in multidisciplinarity, except that

they are grouped in such a way as to enhance the relationship among them. Communication is sporadic and symmetric, implying a situation in which there are occasional chance encounters which are the exception rather than the rule.

Thus, pluridisciplinarity is of wider scope and higher intensity than is multidisciplinarity. First, there is a mandate serving to group the disciplines: they are related in some fashion. The broadening scope indicates a greater range of disciplines to be accommodated. Also, the degree of integration or cooperation is increasing, although not substantially, as pluridisciplinarity assumes some of the elements of Blum's coordination, whereby independent programs are influenced by a common agency or a purposeful grouping.

Crossdisciplinarity

Although crossdisciplinarity is closely related to pluridisciplinarity, its intent is different. It originates when one discipline requires other disciplines for its very existence. The relationship could be established by a system of cordial relations (Swora and Morrison, 1974). Or it could imply a "brute force" approach that one discipline uses against others (Jantsch, 1972a).

Voskamp (Hamsch and Vollman, 1983, pp. 24, 25) referred to "interdisciplinarity of concepts" and "interdisciplinarity of methods" to describe interaction that occurs when "models or concepts developed in one discipline are needed to supplement research in another discipline" or when "methods peculiar to one discipline can be used for research in other disciplines".

Meeth (1978, p. 10), defined the term crossdisciplinarity as "viewing or observing one discipline from the perspective of another". The synoptic fields that have emerged as disciplinary hybrids and hyphenated compounds, such as art history, are examples. Furthermore, such activities as describing the physics of music or the politics of literature are crossdisciplinarity. These cordial relationships have naturally evolved as research and education have focused on the interrelationships among disciplines.

The "brute-force" approach is widely recognized as well. Jantsch (1972a) discussed the tendency for one discipline to dominate in any crossdisciplinary activity. There is rigid control over the entire process because a postulate, rule, principle, method, or concept, is "imposed upon the other disciplines" (p. 107). This determines both the type of relationship among the disciplines and the degree of influence exerted.

Newell and Green (1982, p. 24) explained further:

One of the disciplines involved usually exercises complete hegemony (a kind of

disciplinary imperialism) over the other in such a fashion that the second discipline (or, more properly, its subject matter) becomes a passive object of study rather than an active system of thought, so that the analysis draws critically on only one discipline.

Consequently, one discipline dominates a one-way communication. It exerts its priority by means of an asymmetric communication network (Hamsch and Vollman, 1983). The relationship is less sporadic than a pluridisciplinary relationship in that it is more consistent, systematic and regular. But the contact is disproportionate and distorted to suit the immediate needs of one discipline.

The disciplines involved in crossdisciplinary activities remain relatively isolated. Kocklemans (1979, p. 127) acknowledged that there were no "attempts being made to integrate the disciplines themselves or even parts thereof into a new discipline". Crossdisciplinarity is more enticing, suggesting a synthesis. But it "allows faculty to remain in their own disciplines, while adopting only what is applicable from another" (Meeth, 1978, p. 10).

Crossdisciplinarity is an improvement over pluridisciplinarity in both dimensions of scope and intensity. Scope is broadened in the sense that any discipline could ideally be utilized to supply concepts, skills and concepts on demand to another discipline. The criterion of "relatedness" no longer applies; the criterion of "worthwhile use" has replaced it. However,

in reality, the range of disciplines to be involved will be limited by the fact that the relationships are more by fiat than by agreement.

Crossdisciplinarity is higher in intensity, in that interaction is not optional but central to the connections established. Whether one uses a disciplinary perspective that merges others or imposes one discipline's methods or concepts on other disciplines, a high degree of coordination is necessary. A principle supplied by the host discipline determines the disciplinary contributions. However, crossdisciplinarity by no means achieves a level of coherence necessary for true integration

Interdisciplinarity

Interdisciplinarity involves putting disciplines together in new and different ways. It is the creative management of skills, concepts and methods from several disciplines in such a way that the capacity for interrelationships is increased. It thus extends the possibilities that are only potentially evident in multidisciplinary, pluridisciplinarity and crossdisciplinarity.

It contrasts with the multidisciplinary approach involving several disciplines which do not interact with one another. True interdisciplinary effort attempts to

integrate the contributions of disciplines rather than simply juxtapose them.

Unlike pluridisciplinarity and crossdisciplinarity, interdisciplinarity breaks down the "old partitions belonging to the order of juxtaposed disciplines and makes it necessary to identify new interdisciplinary links" (Gozzer, 1982, p. 287). These previous attempts resulted in artificial manipulation of disciplines with various disciplines interlinked to form composite structures. In that sense, one would be more accurate to talk of "the unification or coordination of disciplines rather than interdisciplinarity" (p. 283).

The term also implies more than imperialist attempts to impose one discipline over others. Instead, "interaction is reciprocal so that one discipline is never subjugated to another" (The International Encyclopedia of Higher Education, 1977, p. 2211). What is strived for is a balance of influence among the disciplines. Each discipline ideally complements and illuminates the other. Thus exchanges are in order,

where cooperation among various disciplines leads to active interactions, to a certain reciprocity of exchanges resulting in mutual enrichment. (Piaget, 1972a, p. 137)

This mutual enrichment can be accomplished in many ways. Interdisciplinary is

an adjective describing the interaction among two or more different disciplines. This interaction may range from simple communication of ideas to the mutual integration of organizing concepts, methodology, procedure, epistemology,

terminology, data, and organizing of research and education in a fairly large field. (Apostel, 1972, p. 25)

Gozzer (1982, p. 290) saw its domain "ranging from straight forward communication of ideas to reciprocal integration of key concepts, vocabulary, methods and procedures".

Thus interdisciplinarity offers the most opportunities for creative interchanges among disciplines that are structured to produce planned interaction. The disciplines are forced to interact through specific proposals. These interactions preferably result in the disciplines having some effect on one another's perspectives.

In that regard, Jantsch (1972a) concluded that interdisciplinarity is a legitimate format to effect change in the sense that coordination of disciplines to pursue common purposes necessitates continuous change in disciplinary contexts and structure. Although Jantsch was speaking from the point of view of a systems analyst, his comments point to an added dimension of interdisciplinarity - that of synthesis.

The interaction of disciplines ideally results in more than an exploration of their concepts and methods. Interdisciplinarity is

a way of organizing specialized knowledge that modifies the concepts and boundaries of separate subjects and gives them a new and original form. (Moroni, 1978, p. 483)

A synthesis is in order, in that the disciplines are "built-upon", resulting in a changed product.

Newell (1983, p. 246) noted that interdisciplinarity may indeed analyze disciplines, but only as a preliminary step to "synthesizing their insights into a larger perspective". Involved is the development of a mode of thought which "ultimately purports to enable one to synthesize ever increasing amounts of discernible and subliminal input" (Swora and Morrison, 1974, p. 46). In other words, the disciplines lose somewhat by lending their concepts, skills, or methods to a cause that interrelates their contributions, extending and modifying them in the process.

Synthesis and Integration

This aspect of interdisciplinarity - synthesis - requires further definition of the word "integration". Furthermore, one must examine the relationship of integration to interdisciplinarity.

The former term is frequently used as a synonym for interdisciplinarity in its generic sense. As such, it becomes a wide ranging umbrella term for efforts to unify disciplines.

Fetthe (1977, p. 102) asserted that the purpose of integration was "to foster interdisciplinary understanding by showing basic similarities among all the fields of knowledge". And, an integrated program is "a term used

for an interdisciplinary program of studies" (Hawes and Hawes, 1982, p. 119). Finally, integration is taking content and putting it together in forms "in which the interdisciplinary connections are made clear" (Humphreys, Post and Ellis, 1981, p. 2). One can conclude that integration is used synonymously with interdisciplinarity.

Then too, interdisciplinarity is the attempt to integrate the contributions of disciplines. Batts (1985, p. 2633) called it a "prudential form of curriculum integration, conserving some of the advantages of subject disciplines". However, Beck (1980, p. 29) made the most succinct connection, simply that "the interdisciplinary approach integrates".

McGrath (1978, p. 6) argued for an awareness of integration in interdisciplinarity:

To convey the notion of genuine interdisciplinary work the word "integrated" might be more appropriate because it connotes wholeness. This is no finicky debate over educational terminology. If interdisciplinary studies are to convey their proper educational objectives, a sense of integration must be provided.

Of course interdisciplinarity has been legitimately referred to as an attitude (Cohen, 1978), a mode of thought (Swora and Morrison, 1974) and an issue of context (Dallas, 1982). The "interdisciplinary mind" is one that perceives relationships (Swora and Morrison, 1974, p. 48). All point to an emphasis on ways to provide integrative educational experiences for students.

Naturally, some disagreement exists over terminology. Integration that fails to reach a potential synthesis of experience for the student is often called interdisciplinary. As Walker (1978, p. 133) decided, integration is not just a better way of solving particular problems which transcend disciplinary lines, neither is it to talk simply of interdisciplinary education in which

it is assumed that a group of specialists may hope to say something about complex and general phenomena.

Others saw an essential difference between integration and interdisciplinary enquiry:

The former tends rather self-consciously to bring disciplines together in order to merge them, while the latter initiates inquiry naturally from no particular disciplinary standpoint and uses the disciplines as it needs them to help provide answers. (Macintosh and Smith, 1974, p. 25)

Pring (1973b, p. 135) argued that true integration

applies only when concepts or propositions of various disciplines are blended together to form a new structure of concepts and propositions.

Otherwise, curriculum integration is only a "grandiose way of talking about interdisciplinary enquiry" without any apparent synthesis (p. 149).

Pring explained that the focusing of knowledge on a particular set of questions does not involve necessarily a new integration of that knowledge because

there is not necessarily any new structure to that knowledge. Or, at least, if there is such a structure, then it would have to be shown. Then (what one has is) not an integrated but rather an interdisciplinary approach to a problem or an area of interest. (p. 135)

Consequently, integration only results in a synthesis whereby the concepts no longer exist in their original state but have "lost the established cognitive status which they held in their own disciplines" (Deer, 1981, p. 390). Concepts are unified together in "a single unit, which possibly is expanded as a result of the two being unified" (Chadwick, 1982, p. 54).

Obviously, much of the discussion about integration is in the realm of philosophy. Gibbons (1979, p. 323) analyzed the concept of integration to try to discover "what happens, logically, when concepts and propositions from different disciplines are brought together in a synthesis". Meeth (1978, p. 10) defined integration as "bringing interdependent parts of knowledge into harmonious relationship". Inherent to integration is the idea that "the sum is more than simple arithmetic sum of parts", and that "some form of action must be undertaken to achieve an integrated or superior whole" (Toombs, 1981, p. 1).

Integration is "the act of making a whole out of parts" (Macintosh and Smith, 1974, p. 25). Integration

assumes the existence of parts, which can be so related as to make a whole. Part and whole here are relative terms. Thus, a set of related facts may yield a generalization or principle. Relating this principle to other facts or principles may yield a still more general principle or possibly a theory. Integration involves the adjustment, the proper relationship of part to part, part to whole, and whole to part, and the combining of these parts into a complex whole. (Dressel, 1958a, p. 1)

Thus, integration covers both the synthetic creation of a whole from parts and the principles governing the relationships of parts within a whole.

Integration in Education

Integration in education entails focusing on interrelationships among the experiences that students have in school. "To talk of integrative education at all is to focus concern onto relationships and patterns" (Walker, 1978, p. 139). Since subjects and disciplines occupy a school timetable, integrative education implies interrelating various subjects as they exist or starting with a global concept and borrowing material from various disciplines.

The school must respond accordingly in its arrangement of educational experiences for students. The "mere exposure to organized knowledge will not produce unity" (Toombs, 1980, p. 1). This distinctive feature of integration mandates particular actions from the school. Bent and Unruh (1969, p. 66) explained:

Since integration is a process of unifying insights and outlooks, then the greatest service the school can render for youth is the integrating and unifying of the curriculum so that it assists him with the integrating problem by helping him see associations and relationships, make applications, and transfer learning to new situations.

Blenkin and Kelly (1981, pp. 131, 132) illustrated how misconceptions of the meaning of integration

led to the introduction of many botched up schemes of integrated studies, to the cobbling together of subjects and bodies of knowledge with little concern for the coherence of what resulted, to integration from without rather than from within.

The validity, even the sanctity, of traditional subject divisions was accepted and as a result curriculum integration was seen by many as an attempt to do the impossible, to reconcile the irreconcilable, to integrate totally discrete elements of knowledge, to mix oil and water.

Indeed, Deer (1981, p. 391) wondered if integration was of any practical concern to teachers, whether it was "beyond the capability of teachers", being instead "a task for specialists in the discovery of knowledge".

Fethe (1977) made rather modest claims for integration. Educators should foster an interdisciplinary understanding in students by showing basic similarities among all the fields of knowledge. He thought that

an integrated curriculum can help a student take learning from one discipline and use it to understand another, perhaps quite different, discipline. (p. 96)

Thus

knowledge in one category can be used to produce, justify or simply understand the knowledge in a different category. (p. 97)

However, integration is more than an arrangement of the curriculum or the instructional techniques of a school. The term is used primarily to refer to the mental process of creating meaningful patterns from one's experiences. The emphasis is on a student's ability to create his own coherence within his experiences as he

engages in studies which "are linked for him by becoming part of him as a person" (Dancy, 1982, p. 25).

Blenkin and Kelly (1981, p. 134) stated that the only meaning or purpose for curriculum integration is "the promotion of the cognitive development of each individual pupil". Thus integration is a process taking place in the student as he unifies his experiences. Achieving unity and coherence of experience is the task of each person.

What is important, therefore, is the person's organization of his learning into some coherent repertoire of skills, concepts, and methods to give him a unified perspective on life. Integration is a conscious effort. More importantly, a person's quest for integration of knowledge and experience is a continuing task.

Dressel (1958a, p. 23) stressed that the educational concern with integration

must be with the integrative process in which man engages as he strives to organize in meaningful fashion knowledge and experience which at first seem largely unrelated.

This concern was justified because "too little of our past thinking educationally has dealt with the integrating person" (1958b, p. 253).

Dressel (1958a, pp. 10, 11) elaborated:

The word "integration" is used to refer to both a state and a process. As a state it implies the attainment of perfection, completion or wholeness. Integration in this sense is a goal toward which every individual presumably should strive. As a process, however, integration refers to the means used to achieve this state of perfection.

The task of education is to design learning experiences to help individuals to continue to organize their own experiences meaningfully.

Dressel (p. 7) distinguished between learning experiences that are either "integrated" or "integrating". Integrated experiences are those educational activities that are planned with the hope that the basis for organization will be understood by the students. Integrating experiences are planned so that each individual is encouraged to make his own organization.

An integrated experience serves a double purpose: (a) it acquaints the individual with meaningful integrations achieved by others, and (b) it provides him with take-off points for achievement of his own integration. An integrating experience also serves two functions: (a) it provides the individual with his own integration of his immediate experiences, and (b) it develops in him some ability and satisfaction in seeking for meaningful organizations of his later experiences.

Accordingly, the

father may build his son a house from a set of blocks or he may encourage the child to build his own house. (p. 8)

Since the integration process is unique to the individual, educators can only plan experiences which encourage this process. They

cannot impose an externally developed scheme of integration, but rather, must motivate the individual to make his own. (p. 23)

For similar reasons the Newfoundland Kindergarten Curriculum Guide (January, 1985, p. 49) concluded that the focus of integration in learning experiences must be the child, because integration

does not necessarily take place because of any particular organization of the curriculum. It is a process which occurs in the mind of the learner. Learning experiences should provide the child with an opportunity to grasp the interrelationships among the various areas of knowledge.

Thus, the role of the school is

to help students, from kindergarten upwards, to understand the integration proposed in the curriculum. All of this is but a means to an end - that pupils begin to organize their own experiences. The objective is to whet, not satiate, the integrative appetite.

The teacher is cautioned not to let

integration take over to the extent that his/her focus is on finding related and similar content in the curriculum and insisting that children be instructed in that content, ready or not. (p. 50)

And such,

there can be only one purpose for curriculum integration - The promotion of each child's cognitive, affective, and psychomotor development. The key task of the teacher is integrating learning experiences in a plan that is challenging and effective for the child and practical for the teacher. (p. 50)

Marshall (1969, p. 125) argued that the duty of the secondary school is to provide the elements for integration, not to integrate them, because

when it performs an integration, it transcends its educational responsibilities. It subverts straightforward basic groundwork in favor of indoctrination, for to impose integrated

knowledge on students is to implant the personal integration of the teacher.

Consequently, educators most differentiate among integration from outside, dominantly outside integration and the student alone as integrator (Romey, 1975). The first is centered on the disciplines, with students letting someone else do the integrating for them. The second means manipulating the student into experiences of well-planned outside integration. The last recognizes integration as a dynamic, educational principle whereby the mind perceives, learns, remembers and thinks in patterns. The person is "more likely to transcend conventional boundaries" because of his "lack of knowledge about the existence of boundaries" (p. 36). This is an attempt to follow the child's natural ways of learning, viewing the world as a whole.

Levels of Integration

Attempts of educators to construct a curriculum which will best enable students meaningfully to relate their school experiences vary tremendously. Each attempt reflects a degree of integration that parallels the degree of interaction among disciplines.

Macintosh and Smith (1974, p. 25) stated that one of the main problems with the term "integrated"

is that the degree of integration can vary widely from a systematic attempt to use different disciplines as a means of providing a

variety of insights into a common theme to the occasional involvement of a geographer and/or economist in a history course.

Integration is a way of organizing learning so that an activity or problem draws upon more than one subject or discipline. Conrad and Wyer (1980, p. 45) defined it as the

development of a body of knowledge and skills through the synergistic combination of several disciplines with the focus on a specific theme or problem.

Each in no way accounts for the multitude of efforts to unify the disciplines that come under the rubric of integration.

In fact, most writers identify levels of integration. Skilbeck (1972) defined integration as any scheme across disciplinary lines that submerges conventional knowledge structures. He distinguished three distinct positions, from "some modest pedagogical propositions about the organization of learning experiences to the full-blown holistic theories" (p. 9). The first was the "perspectivist teaching of separately time-tabled subjects"; the second crossed subject structures; the third resulted in abandoning disciplinary forms for a "new kind of community of understanding" (pp. 10, 11).

Skilbeck named these integration at the subject level, interdisciplinary co-operation, and true integration, respectively. Subjects are "integrated systems of thought". Co-operation respects "the logical

coherence of the separate disciplines". True integration implies that

the disciplines lose their separate identities and are replaced by a new form of the organization of knowledge based on, say, psychological rather than logical principles. (p. 13)

Pring (1973a) elaborated on five uses of integration. The first is an epistemological belief in an overall unity of knowledge. The second is a coherence within certain broad fields of experience. The third, a misuse of integration, means focusing different disciplines upon a particular problem or topic. The fourth requires reference to inquiry to make practical solutions possible. The final use is to describe any interrelation among different disciplines.

Pring (1973b) also examined four different theses about knowledge and related them to integration. The first was the idealism of knowledge as a unity, a whole in itself. The second was less ambitious, in that unity was restricted to amalgamating subjects into broad areas. The third found unity in the method of enquiry, in that the child's own enquiry should be the integrating factor. The fourth acknowledged that the forms of knowledge are distinct, but logically related, so that education's role is to make explicit their connections. These four theories demand different degrees of integration in the curriculum.

Finally, Lucan (1981) provided three meanings. One is integration that preserves the disciplines in an "orchestrated curriculum". Another involves integration that draws on concepts from social science disciplines without regard for disciplines' identity, creating a new course "unlike the parent disciplines". Finally, integration through unification is the construction of a new discipline with its own scientific methods, procedures and knowledge.

Integration covers a gamut of interactions reminiscent of interdisciplinarity in its generic sense. It encompasses a most comprehensive range of possibilities in both theory and practice. As with interdisciplinarity, integration means starting with the disciplines and simply bringing them together, to see what relationships can be found. The ultimate flowering of the process is a new discipline that contains existing disciplinary hierarchies.

The ultimate interdisciplinary synthesis is the creation of a new discipline from existing disciplines. Any interdisciplinary association furthers the emergence of new knowledge. A new discipline sometimes originates from interaction between two or more disciplines. As Swora and Morrison (1974, p. 49) stated, interdisciplinarity ideally

results in the creation of an inter-language among the disciplines, perhaps in the creation of a new discipline.

Jantsch (1980) defined interdisciplinarity in terms of the synthesis of two or more disciplines into a new level of discourse characterized by a new language of description and new structural relationship. What results is a coordination of terms, concepts, and principles permitting disciplines to interact meaningfully under the coordination of a new organizational principle - a new discipline, possibly.

Conclusion

Any definitions proposed for interdisciplinarity do little more than provide the nucleus for subsequent definitions. For a while they become "the most frequently used definitions" (Mayville, 1978, p. 9). Subsequent developments in interdisciplinary theory or practice add new aspects and new perspectives to one's understanding of terminology.

Boisot (1972) discussed three types of interdisciplinarity. One type, a theoretical analysis of knowledge on a rather abstract level, is restricted mainly to the area of epistemology. Addressing sociopolitical concerns, another type, ethical interdisciplinarity, is a more practical mode than the previous approach. Finally, education emphasizes a training function, whereby students are coached in appropriate ways to view reality in its total unity. This presumably enables students to overcome

the fragmentation of a specialized education and helps them create an integrated outlook on life.

This range of possibilities suggests that interdisciplinarity is both broad in scope and high in intensity. The scope of disciplines that can be potentially integrated includes all disciplines. Content can be drawn from any of the disciplines and synthesized to form new patterns of knowledge. This interaction is possible even among the natural and social sciences and the humanities. Such interaction occurs regularly and naturally in interdisciplinary activities.

Regarding the intensity of the relationship, interdisciplinarity is close to true integration. According to Blum's terminology, amalgamation occurs when disciplinary contributions are unified by some organizational principle, whether it be an interdisciplinary issue, topic, question, method, or problem. All interaction is mutually beneficial, because each discipline's perspective is a partner in the endeavor and interchange is reciprocal. This degree of coherence is enhanced by recognizing the synthesis that is inherent to interdisciplinarity.

Transdisciplinarity

Transdisciplinarity has been called "the highest level of integration" (Meeth, 1978). It has been dubbed

the "optimum" (Hamsch and Vollman, 1983), the "new vision" (Jantsch, 1980; Vroomman, 1972) and "the ultimate utopia" (Werner, 1980). It gives renewed purpose and vigour to those seeking integration and synthesis in their educational experiences.

Mayville (1978) concluded that the best interdisciplinary experiences tend toward the transdisciplinary. A new level of synthesis is possible, since transdisciplinarity is "not of the disciplines at all" (Meeth, 1978, p. 10). It means moving beyond the disciplines, involving a "transcendence of subject-lines" (Bent and Unruh, 1969, p. 64). And, it is adisciplinist because it tends to "dismiss the importance of the disciplines altogether" (Newell and Green, 1972, p. 24).

The term was originally coined by Carrothers to imply something above and beyond simple interdisciplinary collaboration (Vroomman, 1972). The ultimate goal is to transcend the disciplines to explore knowledge that is not confined to disciplinary domains.

What is required is a basic change in an individual's level of consciousness that forces him to expand his search for new ways of asking new questions. This quest results in the development of a transdisciplinary frame of reference for mankind.

Kocklemans (1979, p. 145) proposed that all-encompassing framework of meaning is

a necessary condition for making integration of insights gained in isolated disciplines and interdisciplines possible, and for restoring a uniform conception of the world.

To achieve this perspective one must go beyond disciplinary collaboration for investigating knowledge to "develop methods of enquiry that transcend the traditional boundaries and provide integrating and synthesizing frameworks" (p. 137). Genuine transdisciplinarity implies that one is willing to transcend the limited perspective of one's own discipline. The highest level attainable is the identification of a means that would play an important part in the search for the unity of all theoretical knowledge. Any such over-arching framework ought to be the primary concern of transdisciplinarity.

The aim of transdisciplinarity is to develop a paradigm to encompass a number of disciplines. Thus the search is ongoing for a transdisciplinary field, method, principle, or system to accommodate the transcendence that characterizes such philosophical idealism, and to facilitate the degree of synthesis, or integration, expected of any transdisciplinary attempts.

Two essential qualities of transdisciplinarity contribute to the development of its all-encompassing vision. Transcendence and holism, both rooted in philosophy, suggest unity and synthesis. The former is basically an existentialist belief in man's constant search for wholeness in all his experience, such that he naturally imposes a pattern that is unique to that

individual. The latter is a complementary term, implying an ideal epistemological unity of all knowledge. Both are acknowledged as central to transdisciplinarity.

Transcendence

Transcendence is that quality in man that enables him to see possibilities not yet realized in his life or his world (Huebner, 1966). It is an awareness of the potential not yet manifested. Man can grow as he becomes "aware of what is yet hidden in his world of possibility" (p. 109). It is that capacity for wonder and awe that points to a world beyond the immediate. Its most personal manifestation is the question that we all ask:

"Who am I and what is the meaning of my life?"
The larger question that the philosopher or artist or religious leader asks is, "Who is Man?" These are questions that have no final answers.

Transcendence is an exploration of personal meaning as the individual seeks answers to these questions.

Transcendence in transdisciplinarity is "a nontheological interpretation of the religious concept of transcendence" (Phenix, 1971, p. 272). It is fundamental to human nature, since man's consciousness is rooted in transcendence. It is universal, an inherent property of conscious being, because every concrete entity is experienced within the context of wider relationships. All human consciousness experiences an infinitude of

"never finished enlargements of contexts within which every bounded entity is enmeshed" (p. 272).

This critical awareness is the focus of transcendence. It is a conscious effort on the individual's part to go beyond that which exists and recreate meaning for himself.

Greene (1971) discussed transcendence in literature as the recreation of a work in the reader's consciousness as he moves beyond the literary work to give it a synthetic form, a new totality. He uses a process of reconstruction that goes beyond the literary product to create a meaningful synthesis.

To Greene (1978), transcendence is fundamental to any aesthetic encounter with the arts. The artistic experience demands a critical awareness as a person strives to recreate meaning. Each individual pursues his own coherence as he integrates what he perceives, since

every living individual existing in a multiplicity of realities seeks at some level to integrate them to overcome incompleteness and unify his or her own world. (p. 202)

The individual possesses an inherent concern for wholeness, since it is in his very nature to be "constituted by the hunger for wholeness" (Phenix, 1971, p. 280). Everyone is in essence a network of relationships, a state of awareness that Merleau-Ponty called "the miracle of related experiences" (Greene, 1971, p. 268). As Laszlo (1972, p. 336) stated, the mind strives for completeness, because

neither a steady flux nor an unpatterned random flux can be organized into experience. Nonpatterned experience would most likely stall man's perceptive and intellectual processes.

Therein lies the relationship between transcendence and transdisciplinarity. Transcendence demands "opportunities for the enrichment of understanding in diverse areas of human experience" (Phenix, 1971, p. 280).

Transcendence and Dewey

The educator must create a curriculum that fosters a comprehensiveness of experience. However, the curricular challenge is that "the synthesis of knowledge within the individual can never be wholly dependent on how it is taught" (Berman, 1968, p. 96). "Synthesis is personal", stated King and Brownell (1966, p. 144). The educator can never assume that any curricular arrangement produces a unity in the minds of students.

This challenge has been the focus of philosophical debate for many centuries. Historically it has revolved around a dichotomy that John Dewey (1902, p. 176) reduced in his simplest terminology to "the case of the Child versus Curriculum".

The crux of the debate is how to widen a student's perspectives to develop the critical awareness that is so crucial to transcendence. One doctrine insists on prior development of schemes to order knowledge for consumption, while the other argues that the individual can only impose

his own unique configurations on knowledge as he structures his own experience.

These have been labelled the logical and psychological aspects of learning and teaching, respectively (Dewey, 1916; Hirst, 1967). John Dewey, the first philosopher to use these terms in an educational context, isolated only two methods for organizing educational experiences for children. The logical method is to begin a student's study with knowledge ordered into structures determined by specialists. These are perfected domains of knowledge that exist independently. The psychological method follows the child's natural tendencies to impose patterns on his experiences.

Dewey (1902) explained this fundamental opposition of child and disciplines. One places priority on the subject matter of the curriculum. This maintains that the world is "arranged on the basis of eternal and general truth; a world where all is measured and defined" (p. 177). Studies reflect well-ordered realities which place emphasis on the subdivisions of the subject matter. Logical sequences are presented to the child who is

simply the immature being who is being matured; he is the superficial being who is to be deepened; his is narrow experience which is to be widened. It is his to receive, to accept. (p. 178).

The other doctrine posits the child as the pivot of education because his growth and development are the ideals that furnish the standard for the curriculum. "Not

knowledge or information, but self-realization, is the goal" (p. 179). Learning is an active, purposeful activity on the part of the student. It argues that

the only significant method is the method of the mind as it reaches out and assimilates. Subject matter is but spiritual food, possible nutritive material. It cannot digest itself; it cannot of its own accord turn into bone and muscle and blood. (p. 180)

The child's world is characterized by unity and completeness, because all of his experiences are held together by the unity of his personal and social interests.

The logical stance classifies experience as a product of the ages, and not the personal development of the child. While it indicates a state of fulfillment for knowledge, it neglects the process whereby each person structures experience. The classification is not a matter of child experience, but the result of a process of separating and reformulating facts around new abstract ideal centers. The psychological aspect recognizes the practical bonds of child life, and the integrity of his personal world. One identifies the curriculum with disciplines; the other identifies the child as the center of the curriculum.

The Case for the Disciplines

Philosophical arguments to support the logical half of Dewey's dichotomy have been proposed for centuries. Hirst (1974, p. 54) stated:

The thesis that human knowledge, meaning and understanding consists of a limited number of quite different kinds has, for many diverse reasons, fascinated philosophers from the time of Plato down to the present day.

Wellington (1983) catalogued several schemes from the time of Kant to the time of modern British epistemologists. For example, Kant proposed twelve categories of knowledge as conceptual schemes essential to any perception of the world. The intent was to impose these categories on jumbled experience to make sense of it and to structure experience to aid a person in his quest for meaning. These schemes argued that transcendence was possible only through logical classification schemes imposed on the learner.

Phenix (1971) theorized that transcendence depended upon six realms of meaning. Through an hierarchy of meanings, an individual can fulfill his need for integrity and wholeness. An awareness of transcendence provides

justification for a broad and variegated curriculum securely grounded in the specialized disciplines. Studies are pursued in depth according to the tested methods of these disciplines. (p. 281)

However, Phenix agreed that the disciplines ought to be complemented by an awareness of any interrelations among them. This would insure that education would proceed

always with an eye to the similarities and contrasts with other disciplines and in full awareness of the need for complementation by alternative perspectives. (p. 281)

His six categories, although considered indispensable to the curriculum, were inadequate without an interdisciplinary perspective. Students need to be made aware of the partiality of each disciplined outlook:

What consciousness of transcendence does is to make one aware of the partiality of each disciplined outlook and sensitive to the many sidedness of the reality that one confronts. (p. 280)

A more comprehensive perspective is necessary to acknowledge that the truth of any discipline is never the whole truth, and that there are relationships among the disciplines. But the specialized disciplines were, to quote Dewey (1902, p. 177), the "logical subdivisions", the ideal forms of knowledge each person needed as a foundation for transcendence.

Similarly, Hirst (1974) argued for priority for the disciplines. The attainment of a rational mind - Hirst's equivalent to Phenix's self-transcendence - meant exposure to a number of logically distinct forms or disciplines. These imposed conceptual schemes on knowledge. His argument was that

the development of mind has been marked by the progressive differentiation in human consciousness of some seven or eight distinguishable cognitive structures, each of which involves the making of a distinctive form of reasoned judgment. (p. 25)

All knowledge and understanding is located within these domains.

These forms of knowledge make the whole of experience intelligible to man. They are conceptual categories

necessary for achieving understanding, because individuals bring these forms of knowledge to bear on every situation in order to understand the situation. Since ordinary experience in itself is inadequate for developing concepts, the forms, as distinctive networks of relationships among concepts, are necessary to ensure some order to otherwise confused experience.

These forms are the essence of a unity of consciousness, a rational mind, or transcendence. Hirst explained:

The structure of an individual's consciousness is certainly the structure of the concepts, knowledge, and judgments that he has acquired and it has that unity which these elements possess. (p. 145)

The structure that students will realize from education is one that man already has as logically organized disciplines. Further, Hirst argued:

I fail to see what unity of consciousness can be sought in education other than that which exists in these elements. In talking of concepts, truth, criteria and knowledge, as educational objectives, one is talking about the very elements of consciousness one wants pupils to acquire. (p. 145)

He continued:

There is no need to evoke some mistaken doctrine of the unity of mind or consciousness independently of logical considerations. What is more, the maximum unity of consciousness a person can ever legitimately hope to have is limited by the unity to be found in the structure of human knowledge and understanding, a domain which I have argued is complex of differentiated yet inter-related forms. (p. 146)

Mind is a project of the forms of knowledge and their interrelationships.

As did Phenix, Hirst acknowledged the interrelations among disciplines. In spite of loyalty to distinctive forms of knowledge, he agreed that curriculum could move beyond these forms:

The distinctive conceptual structures within knowledge are part of what has to be mastered in acquiring knowledge. But it does not follow that they must explicitly map out the content of every curriculum. The content must be planned and structured to achieve objectives that have their own interrelations. (p. 6)

The curriculum could be structured around topics and other principles to enhance relationships among the disciplines, so long as it is understood that

the development of understanding involves the mastery of conceptual structures which are not reflected in the topic - organization. (p. 6)

Hirst expected education to provide a study of all the various forms of knowledge. This study would give students sufficient genuine insight to use the concepts, logic, and criteria accurately in the different forms. However, it does not follow that

a curriculum must or ought to be divided into subjects that mirror distinctions between the forms of knowledge. (p. 140)

Instead, educators ought to provide opportunities to study the distinct forms and their interrelations.

Hirst gave credence and legitimacy to areas of study whereby different forms of knowledge are focused on some particular interest. In fact, "the conceptual and logical

elements shared between forms and the interrelations they indicate are considerable" (p. 89).

For example, the concepts of one form may presuppose the concepts of another. The concepts of space and time belong to several forms and are also presupposed by concepts in others areas. An area of study or research does not have to direct itself to one fundamental kind of knowledge.

Hirst stated clearly that interrelations, albeit secondary to the forms themselves, could not be forgotten in curriculum planning. Accordingly, there is no need to structure a curriculum solely in terms of the forms of knowledge:

A curriculum must also include some indication of the relations between the forms where these overlap and their significance in the major fields of knowledge, particularly the practical fields, that have been developed. (p. 48)

Hirst did make clear, however, that any interdisciplinary areas

do not constitute new areas on the map of knowledge based on the logical distinctions I have mentioned. They are essentially composite, second-order constructions, not to be confused with the primary forms of knowledge which I have distinguished on logical grounds. (p. 27)

They do not integrate different forms of knowledge but merely break down traditional divisions that education has made in knowledge. The central element in his original thesis, that knowledge exists in logically distinct forms, was maintained. One must balance interdisciplinary connections with the forms of knowledge.

Finally, Hirst admitted that a disciplines-oriented curriculum might fail to communicate relationships among concepts. Also, it might fail to apply sophisticated abstract concepts to everyday contexts. Both are "indeed failures to achieve important elements in the structure of consciousness and might well be pigeon-holing of the mind" (p. 46). However, these are not the consequences of his theory, but "failures to teach adequately the logical relations between objectives that are part of their logical structure" (p. 46).

The two complementary approaches aid the individual to achieve a transcendent perspective on life. As a matter of fact, the interrelations among the forms can lead to such an awareness but also benefit the disciplines themselves, in that "what is understood in each discipline is thereby deepened" (p. 27). Any education embracing both aspects would enable the individual to develop an holistic outlook on life, since it includes all that makes man a rational, aware being.

Nevertheless, that doctrine is by no means universally accepted as the best way to help an individual derive meaning from his experiences. Many philosophers argue that the inherent logic of the disciplines is not essential to the structuring of experience. In fact, Wellington (1983) called schemes such as Phenix's and Hirst's logically invalid, because the disciplines could

not be shown as necessary or sufficient for the acquisition of knowledge.

Wellington challenged the disciplines doctrine to actually demonstrate the uniqueness of conceptual categories. Otherwise, it cannot prove that certain forms of enquiry are unique. He cautioned educators to

beware of any transcendental tendencies in defining and justifying curriculum decisions. Any useful definition of education must admit the possibility of "categorical change". Moreover, because the forms of knowledge are necessarily non-unique, the barriers between them must be subject to change. (p. 22)

Accordingly,

There can be no logical or conceptual criteria which are fully adequate in dividing our knowledge into separate distinguishable compartments. (p. 22)

Furthermore, this doctrine is actually a product of a transcendental deduction. Its justification is couched in terms of an intrinsic value hidden in the disciplines themselves. The proposal merely claims a "right to exist" as a democratic ideal of "self-expression" (p. 19). For example, Hirst's argument actually prevented further analysis because any attempt to question his presuppositions already implied a prior commitment to his forms of knowledge. His was a circular argument that defied criticism. Korner (1967) called it "the impossibility of transcendental deductions".

Champlin (1969, p. 167) called the disciplines argument a teleological fallacy because, like religion, it claims a purpose "behind, above, or other than that

purpose of those purposes distinctive as human goals or anticipations". What ensues is that

a describable consequence of an object or event is converted into a causal constituent of that object or event. (p. 167)

In other words, to convince one of the logic of an argument, faith functions where proof cannot. The doctrine on which the disciplines rests its case is thus logically invalid. This is the gist of the psychological aspect of Dewey's "Child versus Curriculum".

The Case for the Child

Greene (1971, p. 267) asserted that a curriculum derived from the disciplines is external to a person's search for meaning and ignores his "existential predicament and primordial consciousness". It is an "alien and an alienating edifice - a land of crystal palace of ideas" (p. 262). Greene suggested that we should not be satisfied with any instructional system

in which the teacher is endeavoring, with respect to his subject matter, to bring the understanding of the learner in equality with his own understanding. (p. 267)

Any articulated or prestructured curriculum excludes the subjectivity of the student and engenders a feeling of separateness on his part.

In her opinion, a curriculum based on the disciplines resembles a map and the learner is a stranger. It has standards of operation determined by the subject matter. It must be communicable while also being appropriate to

educational aims derived from the disciplines. For example, Phenix (1964) defined education as "a guided recapitulation of the processes of enquiry that gave rise to the fruitful bodies or organized knowledge" (p. 48). This is, in Greene's opinion, like "asking a newcomer to recapitulate the concrete process by which the cartographer made his map" (p. 260). This is "not the initial concern of the newcomer, who is merely looking for landmarks to identify so he can proceed on his way" (p. 261).

Instead, the learner must "generate order and meaning, to generate structures of knowledge to provide meaningful unifying perspectives" (p. 262). He must be placed in a position where he can be committed to the need to act. He must be enabled to attain a perspective that will help him to realize what it actually is to "generate the structures of the disciplines on his own initiative, against his own background of awareness" (p. 268).

Greene saw this process as the crux of an individual search for synthesis. Her recommendation was that educators consult the phenomenologists for an approach to curriculum. They could "remind us of what it means to an individual to have a quest for meaning" (p. 267). Also they could provide a philosophical justification for arranging educational experiences to best facilitate the quest.

Drawing on Merleau-Ponty's theories on the development of human consciousness, particularly a person's innate ability to structure his own experiences, Greene stressed that a child uses his own unique structures of perceptual consciousness to understand his environment. These underlie the cognitive structures that can later emerge as subjects or disciplines. Anybody can "effect certain relations within experience, organizes, informs, before being capable of logical thought. Consciousness exists primarily as the ground of all knowledge and rationality" (p. 257). Thus the world is "constituted for the child through his perceptions prior to the construction of cognitive structures" (p. 257).

A child searches for meaning by confronting the cognitive structures associated with rationality - the disciplines - in a state of wide-awakeness while imposing his own subjective patterns on what he perceives. The mind of man is prompted by a personal drive for meaning. This doctrine is the foundation of an existentialist philosophy.

According to Tayler (1972), individuals reconstruct reality and create order out of a diversity of experiences by imposing on them various ordering schemes. This is the

human capacity to order diverse observations and the function of these ordering processes in the human search for order and meaningfulness. (p. 273)

The child is

endowed with multiple relations prior to his formal education. He inherently acts in terms of universal relationships and can naturally move from one to another without isolating individuals. (p. 277)

He uses universal principles underlying the integrative ability of all men to bring about an all-encompassing framework of meaning.

True integration is derived from these principles. The aristocratic ideal of the whole person is based on beliefs such as that held by R. Buckmaster Fuller, that

a main task of the human intellect is to put things together in comprehensive patterns, not to separate them into separate compartments. (Taylor, 1970, p. 69)

Greene (1978, p. 202) reiterated that

every living individual existing in a multiplicity of realities seeks at some level to integrate them, to overcome incompleteness and unify his or her own world.

An individual creates his own ordering of knowledge in a transcendence of established categorical schemes traditionally deemed necessary by society.

Involved is a reflectiveness that permits individuals to classify experiences. Korner (1967) stated that these categorical frameworks are dependent on the distinctions that the individual makes. They are further enriched as the individual acquires more ways of conceptualizing experience. The three basic regions of experience-empirical, non-empirical, and value judgments - are

extended and modified as one applies more novel, sophisticated structures to them.

Laszlo (1972, p. 367) argued that

the forms of mental organization of experience constitute the basic characteristic of all human activity. From there derives the generic unity of the arts and the sciences. The sciences, as well as the arts, deal with experience and they all organize experience in matter. The mind's pronounced requirements to apprehend varied experiences and organize it into coherent things and events shows that the experience-organizing function of the mind is a basic principle comprising all facets of human endeavour.

In that context, Munby (1978, p. 123) defined knowledge as:

a highly complex set of articulated or unarticulated propositions which might be construed as summing up to an integrated view of our world. We think of ourselves as each possessing a unique and conceptually rich image of the whole.

Knowledge gathered from education in the form of subjects and disciplines is mere "surface" knowledge, while knowledge is really a metaphysical assortment of assumptions that the individual is often unaware of. The role of the educator is to "lay bare for our students this metaphysical knowledge" (p. 125).

Holism

Holism is an epistemological belief in the unity of all knowledge. This holistic view of knowledge is "as old as mankind" (Blum, 1985, p. 2600). The ideal was possible prior to the nineteenth century because the

unity of the world view as well as the unity of sciences was then guaranteed either by an all-encompassing religious view, a universally accepted philosophy, or a common ideology. (Kocklemans, 1979, p. 15)

Holism has "an underlying faith in the unity of knowledge" (Newell & Green, 1982, p. 24). It is the search for a means to synthesize all knowledge. The ideal was defended as follows:

All life forms on the planet earth are inextricably interlocked and no education is complete without an understanding of the ordered, interdependent nature of the universe. (Boyer & Levine, 1981, p. 40)

Deciding that "the itch for unification is there, and it is hard to avoid scratching it a little", Boulding (1981, p. 129) continued:

The search for the unity of all human knowledge comes from the faith, perhaps a little blind, in the fundamental unity of the real world and its inescapable interconnections.

This unity is being sought by modern man as he envisages a coherence idealized by holism. There is a renewed emphasis on the interconnectedness of all things, a resurgence of the belief that, as "eons ago, all things were connected", so it must be for our generation (Wolfe, 1984, p. 29).

During the 1930's and 1940's, Einstein was pursuing the elusive unified theory for knowledge. From that period came many proposals to deal with the unification of knowledge which were very attractive as ideal models for those whose interests lay with such matters. All presented arguments for unifying principles for knowledge.

Holism is essentially a transdisciplinary concept. Jantsch (1980, p. 306) discussed transdisciplinarity as the "recognition of the interconnectedness of all aspects of reality", and an "attempt at grasping the total dynamics of reality as a whole". Thus transdisciplinarity depends on the development of some method for accommodating a number of disciplines and thereby integrating their contributions into a single entity.

Transdisciplinarity results in the synthesis of knowledge in a form other than that from which it originates. Hausman (1979, p. 10) discussed the

natural evolution of disciplines, that is, an attempt to view disciplines as related through some principle of interaction more fundamental than any one of them.

This is the search for "superdiscipline" (Newell and Green, 1982). Involved is the attempt to "reshape and reorganize the fields of knowledge by means of exchanges which are in fact reconstructed recombinations", a process that results in new disciplines (Piaget, 1970, p. 524).

The Search for Holistic Methods

Ross (1981, p. 23) used an analogy to describe the development of transdisciplinary subjects:

Transdisciplinary materials were not a subject, but were made up of several subjects. The assumption was that a subject somehow circumscribed a part of the whole and all studies of that part were made in the name of the subject. It further assumed that the circumscribed bit was kind of a natural whole. Then, in interdisciplinary study, if one added still another such whole, one could talk about the two but could no more study them together

than one could study apples and oranges together, which cannot be added to make a genuine sum, but are forever apart arithmetically. Somehow, it was not pointed out that if one studies apples and oranges together, one is closer to learning about fruit than if one studies each separately.

Transdisciplinarity attempts to supply the means for studying both apples and oranges in a manner to highlight their common characteristics.

One such method consists of shifting interest from the disciplines to the notion of prescribed problems which presume an "existing set of relevant disciplines that are transcended" (Radesh, 1975, p. 232). Meeth (1978) suggested that transdisciplinary programs start with an issue or problem and bring to bear the knowledge contained in the contributing disciplines. As Ross (1981, p. 23) concluded, "the problems of life are all transdisciplinary".

We might, on the other hand, refer to a theory which enables a group of disciplines to be brought together. Such would permit an exploration of an issue of significant importance within a transdisciplinary framework. A product evolves that is "a system without internal methodological boundaries" (Swora and Morrison, 1974, p. 49).

The ability of general systems theory to function as a transdisciplinary framework has been widely recognized. Hughes (1974) noted the potential value of the systems approach to research. Pratt (1982) and Estep (1977)

concluded that general systems theory could guide curriculum development. R. Buckmaster Fuller (1968, p. 362) suggested that the theory is "one of the modern tools of high intellectual advantage". It could help man to think in wholes.

Jantsch (1980) stated that general systems theory could facilitate a holistic view of knowledge. As the means to overcome the "dualistic split into nature and culture which has haunted Western understanding of reality", it provides a stimulus to link all sciences and humanities (p. 310).

Transdisciplinarity for Jantsch was the ultimate degree of coordination whereby a system of interactions replaces the discrete disciplines. The system revolves around a common axiomatics which would embrace a multitude of concepts and principles from numerous disciplines. What emerged was the coordination of all disciplines by a generalized axiomatics. This is a vision of "truly cosmic scope", involving a synergistic focus capable of

pulling together the physical and social sciences, the arts and the humanities, philosophy and knowledge transcending the rational domain, in short, the totality, of human relations with the world. (p. 308)

Jantsch's dream was a full synthesis between physical phenomenon, biological systems, and social systems. The principles of self-organization recognize the "systemic interconnectedness of all natural dynamics" (p. 309).

This is a transdisciplinary frame of reference of great promise to scholars and advocates.

Boulding (1981, p. 30), one of the originators of the general systems theory, described it as a

hankering for a larger view, a broader perspective than can be found in single departments or disciplines.

He defined general systems theory as "any theoretical system applicable to more than one of the traditional departments of knowledge" (p. 30).

Boulding's impetus came from practical problem solving in that

any investigation of a practical problem of some system in the real world had to transcend the conventional disciplinary lines because the real world was not really divided according to the visual disciplines. (p. 30)

Naturally, therefore,

the inability of the real world to be compartmentalized means that any kind of problem-solving activity requires an interest in the general system that underlies the problem and cannot be confined to any one discipline. (p. 28)

The general systems theory fosters communication among disciplines and permits man to perceive the world as a totality.

A similar transdisciplinary framework is structuralism. For Piaget (1972b), structuralism was a new transdisciplinary frame of reference for scholars that exemplifies the true object of research, to challenge and extend the disciplines. His chief concern was the failure of research to recognize that "all thorough specialization

necessarily involves relationships between many fields" (p. 22). Thus educators at all levels are to prevent the myopia of compartmentalization of knowledge by approaching these subjects "from a constantly interdisciplinary point of view" (p. 24). Structuralism could facilitate such endeavors.

Structuralism recognizes the possibilities for interaction among disciplines through their underlying structures. Structural components could be shared in ways that would efface disciplinary boundaries because "each discipline employs parameters that are strategic variables for other disciplines" (1970, p. 470). A specialist is obligated "continually to look beyond the frontiers of his own discipline" (p. 468).

Piaget (1973) defined structuralism as a system of relationships among phenomena which break down disciplinary walls. The educators' role is to "make their students constantly aware of the relations" (p. 30). Students need help to approach disciplines from a perspective that enables them to know "how to give general significance to the structures they use and to re-integrate them into overall systems embracing the other disciplines" (1972b, p. 24).

These exemplify the search for holistic methods that inspires investigations of commonalities among all forms of knowledge. Tayler (1972, p. 278) described a

conceptual model based on integrative principles that could unify all knowledge, derived from

a holistic educational philosophy and methodology capable of understanding and documenting the philosophical principles inherent in the natural and social sciences, together with the major humanistic systems of mankind.

This model was designed to identify universal principles and develop a pedagogy to use in education. The principles would be employed "to deal with topics and problems so as to develop interdisciplinary linkages" (p. 279). This is a transdisciplinary model for the unifying of knowledge.

Tykociner (1964) inventoried knowledge in the new science of Zetetics, developed as an aid to the study of knowledge as a whole. His intent was to provide integrative principles for discovering new relationships among disciplines. His science seeks

to build a "bridge" between any two such islands of specialized knowledge which seem to be separated but actually are interconnected by as yet unknown links. (p. 122)

His thesis was that

all the fractional knowledge collected, systematized, recorded, and preserved by culture must also be interdependent. (p. 126)

Zetetists, as architects of knowledge, "would learn how to combine knowledge derived from arts and sciences, and mold it into unified structures" (p. 132). Tykociner concluded that

if our knowledge is to become a coherent, unified whole, it should be disseminated by treating it as a whole. And that is the function of education. (p. 147)

Here is another transdisciplinary model.

Fetthe (1977, p. 98) saw little value in such "grand deductive schemes" for the curriculum. He proposed an integrative model based on "holistic intelligence", interpreted as skills and capacities

which transcend the particularity of any single discipline and which could be the foundation of a holistic intelligence equally at home in diverse fields. (p. 99)

His was a cognitive model that could develop a "metaphysics of the disciplines" (p. 101).

This model attempted to identify and describe the common features found in any discipline and then use them to construct a model of intellectual endeavour. With this model

a student could gain a new perspective on his own special field of study, and with the help of this insight, appreciate similarities between his own field and fields which may seem, on the surface, radically different. (p. 101)

This was intended to be a way to overcome the prejudices of the academic specialist.

A Transdisciplinary Perspective

Transdisciplinarity thus utilizes integrative principles to develop an education to help students think beyond the disciplines. These principles are the focus for debate that has occupied educators for a long time.

Educators are striving to give students a new perspective, one that Broudy (1972, p. 164) called "wisdom", implying that

only the individual mind can integrate these diverse interests into a value judgment and later into a commitment, just as only the individual can integrate the diverse categories of the various disciplines into a context in which the social problems stand revealed not only in their perplexity but also in their fundamental unity.

With this transdisciplinary frame of mind, students gain increased capacity to control their own destinies. Only then is the student central to education, seeing content as part of the totality of knowledge and human experience. This perspective is the primary focus of transdisciplinarity. If students

are enabled to pose questions relevant to their own life plans and their being in the world, they might well seek out answers in free involvement with a range of disciplines. Once this occurs, new perspectives will open up. (Greene, 1977, p. 123)

This is essentially an

effort to restore the generalizing power to the student beyond the restrictions of his or her own disciplinary epistemology. (Mayville, 1978, p. 24)

Transdisciplinarity is also a recognition that

each of the disciplines, while unique and autonomous, ought to be logically compatible with the purposes and methodologies of every other discipline so that all become capable of being subsumed within an inter- and even supra-disciplinary rubric. (Tayler, 1972, p. 274)

Thus, transdisciplinarity, with its emphasis on both integrative principles to unify knowledge and the

individual's ability to transcend the disciplines, is the ultimate in Blum's notions of scope and intensity. All disciplines potentially share equal partnership in the education of children, where disciplinary boundaries are non-existent. This is an ideal that may function in theory, but may surface only rarely in practice.

Conclusion

Obviously, interdisciplinarity escapes definition in concise, convenient phrases. Because of its complexity, it requires extensive explanation more than definition. In practice as well as theory, it has developed into what Cameron (1965) called the "hydra-headed curriculum". Little wonder that Doyal (1974) branded it as one of the terms that Lewis Carroll said should be paid overtime for excessive use.

Meanings have become rather diffused, so that any interdisciplinary effort is thwarted by the indiscriminate use of terms. Terms are in danger of losing their significance:

Some social science words and the ideas they represent are "faddish" things. They come into being and become so prominent and widespread in use, and then disappear, virtually from overuse and eventual muddying of their meaning. (Salmon-Cox and Holzner, 1977, p. 1)

Langer (1957), of course, predicted diffusion in terminology as educators become absorbed in exploiting the possibilities resulting from interdisciplinarity. This

situation merely suggests that interdisciplinarity may be wide-ranging and capable of covering multiple practices.

Furthermore, one can conclude that terms have advanced beyond the metaphoric stage. Interdisciplinarity has been viewed critically, and a set of terms has been developed by theorists and practitioners. The educational community, proceeding with greater caution, is gradually overcoming the enthusiastic but naive applications of the past. The paradigm is maturing as one achieves the critical distance necessary to recognize its bounds. Literal expression has replaced figurative language in interdisciplinarity.

In conclusion, two purposes have guided our discussion thus far. We have attempted to explain terminology, particularly why interdisciplinarity is so difficult to define. Also, we have examined the rationale for a conceptual understanding of terms, while maintaining that theorizing must be balanced by practical considerations.

A primary concern must be the articulation of a working vocabulary whereby practical questions can be formulated, observations carried out, and some foundation laid for studying interdisciplinarity. Only then can discourse about interdisciplinarity proceed in a coherent manner, and in a context that would be beneficial to those who need clarification for implementing interdisciplinary activities in the classroom. There the practical

implications must be worked out directly, and that is where all such discussion assumes its most meaningful, useful purpose.

CHAPTER V
INTERDISCIPLINARITY AND NEWFOUNDLAND'S
SECONDARY SCHOOLS

Successful implementation of interdisciplinarity depends on the establishment of a learning environment conducive to change in all aspects of education - the curriculum, teaching practices, and administrative arrangements. Such an environment can provide essential encouragement and support for educators who are challenging previous assumptions, as well as flexible policies to facilitate creative approaches to classroom teaching. Thus, legitimate educational agencies can allow such initiative and provide incentive for change.

Dramatic revisions to Newfoundland's secondary schools in the early 1980's were responses to public demands for more relevant, expanded programs to create a learning environment to meet the needs of students and society. The interdisciplinary approach is one instructional strategy that accompanies the current educational trend in Newfoundland.

The Critical Reformers of the 1960's

Schools in Newfoundland have been characterized by traditional curricular and teaching approaches, with innovations not really gaining widespread acceptance. A general lack of public concern with education meant the

absence of a concerted effort to change prior to the 1960's. Indeed, educational opportunity was restricted by a public preoccupation with poor economic conditions in the province, so that only essential facilities and materials were provided, teachers were poorly trained, students had little incentive to succeed, and traditional schooling was generally accepted as inevitable and sufficient to meet existing needs.

However, a period of rapid transition in the Newfoundland economy, combined with educational trends in the rest of Canada and the mass media, resulted in the challenging of well-established traditions during the two decades after 1960.

Basically, criticisms focused on those aspects of schooling that had perpetuated the traditional approaches to education. The child was ignored by a curriculum that was fixed by textbooks and examinations (Moore, 1967; Horwood, 1968). Lessons, consisting of textbook reading in preparation for external examinations, were not meaningful to students because they did not address their own interests or needs. The curriculum was irrelevant, remote, and fact-oriented. It guaranteed boredom among students and failure as they tried to memorize content rather than to grow intellectually.

Examinations had a "strangle-hold" on education (Buffett, 1967). Teachers, pressured by timetables designed to prepare students for exams, stressed coverage

of textbooks. Teacher initiative and creativity were inhibited, and students were prevented from exploring knowledge as a personal inquiry into meaningful experiences (Nalasco, 1967). The curriculum was reduced to a "static, textbook centered prison" (Wareham, 1967, p. 19). Student motivation for success was fear of exams: teacher motivation to experiment and to participate in curriculum decisions was nonexistent. Furthermore, the textbook pattern of teaching was reinforced by government textbook policies that authorized only those texts on which exams were based. In such a context, curriculum expansion was practically impossible.

Hart (1968, p. 13) decried the teaching attitude in Newfoundland as "sadly inhumane", whereby lessons were administrative units

in which teachers feed facts to students who are trained to restrain their natural inclinations so as to leave the matter whole for immaculate regurgitation as required for examinations.

Students were closeted away in rows of desks to listen unquestioningly. Subsequently, any creativity was ignored, and student intelligence had no opportunity to develop. Hart challenged each teacher to be less an authority in the classroom and more an aide to develop student thinking abilities, problem-solving strategies, and information-professing capability. All were negated by a traditional reliance on textbooks and examinations in education.

The narrow curriculum, poor teaching practices, and external exams led to a serious dropout problem and

failure rate (Rowe, 1965, 1968). The enrollment had expanded dramatically during the 1960's, but the school program had not diversified to meet the greater range of student abilities and interests. Students were not engaged in activities designed to arouse their curiosity, promote thought, and stimulate interest - in essence, to motivate them with relevant knowledge and inquiry-based teaching approaches. Educators were compelled by public opinion to address these issues, because each public outcry demanded educational experiences to meet the needs of all students in the classroom.

There were some isolated attempts at more creative teaching approaches. Team teaching was tried in Ferryland (Raymond, 1966). A team of three teachers was selected on the basis of competency, experience, ability to handle groups, a spirit of cooperation and tolerance, and especially the "ability to enter into wholesome argument" (29). Teachers not involved in large group instruction were consulting with small groups of students. The advantages included a more challenging program, a better accommodation of individual differences among students, an initiation for new staff, and staff professional development.

Bellows (1967) reported on a similar project at Brother Rice High School in St. John's. Some 160 students were placed under three teachers, with a modified schedule to permit two blocked periods. Two large groups were

given instruction in the school cafeteria. The project received an enthusiastic response from teachers and students, but success depended on complementary teaching talents, frequent planning meetings, and a desire to respect participants' contributions. Bellows concluded that "team teaching can have a tremendous impact upon the dynamics of teaching" (p. 30).

Nevertheless, Moore (1967, p. 37) complained that Newfoundland's senior curriculum was fragmented, because "every subject is totally independent and any correlation between subjects is - for the most part - incidental". He suggested that education could be more coherent if history and geography were made part of reading, mathematics were related to real life situations, and science were to foster an investigation of key concepts and methods in a practical content. However, such innovative ideas existed only in the minds of a few educators.

Demands for relevancy and coherence compelled educational leaders to examine traditional restraints against innovation. Influential educational reformers prompted political attention. Several intensive investigations of Newfoundland's educational system provided both incentive and funding to bring schools in line with trends in the rest of North America.

Interdisciplinarity is a beneficiary of three studies into education. The Royal Commission on Education and Youth in the 1960's, the Task Force on Education in the

1970's, and the reorganized senior program in the 1980's were comprehensive examinations of education that contributed significantly to the current status of Newfoundland's secondary schools.

The Royal Commission on Education and Youth

Critical reformers prompted the establishment of the Royal Commission on Education and Youth in 1964. This was the first attempt to study all aspects of schooling and actually permit public debate on educational issues (Warren, 1973). In fact, it "captured a surprising amount of public attention and evoked a lively and continuing debate" (p. 28). Education became newsworthy and public attention was focused for the first time on the need for an expanded curriculum, better facilities, more materials, and revised teaching methods.

The basic premise held by the Commission's Report (Vol. 1, 1967) was that the curriculum was too narrow, too academic, and too inflexible, and needed to be differentiated to reflect social and student needs. A discovery approach to teaching had to replace the "mind-stacking" approach and the "textbook mentality" (pp. 144, 145). Strategies of inquiry and the structures of disciplines had to replace factual teaching.

The Commission acknowledged that teachers need adequate training to implement new methods of teaching and to utilize texts as tools requiring creative approaches.

Curricular options were recommended, with required and elective courses, along with the authorization of multiple texts and more flexible teaching materials. Further, a system of internal accreditation was recommended to replace external examinations. Pilot projects were recommended to encourage creative teaching experiments and teacher input. Finally, an institute was needed to further innovation and change in education. The Commission was obviously responsive to innovative trends in North America.

For example, the student was to be accepted as a determiner of both curricula and educational practices. Long standing reliance on the traditional disciplines for curriculum content and expository teaching practices was questioned. Consequently, numerous possibilities were presented that had no place in the previous curriculum. Modern society demanded modern educational experiences for students.

When teachers were diverted from textbook coverage, they could develop teaching methods that ignored subject boundaries. They could foster creativity throughout the entire curriculum by teaching which "transcends the fundamental processes of given approaches" (p. 170). Language arts skills could be interwoven with other subject areas. Social studies could be integrated and no longer tied to the distinct disciplines. Religious education could be correlated with history and literature

in a unified study of personal development, since all three share values, concepts, and concerns. All subjects could stress high standards of written work. These suggestions were the foundation for interrelating distinct subjects in order to respond to student needs.

Warren (1971) noted that a broader curriculum, more emphasis on learning to think, and less emphasis on formal exams were possible benefits from the Commission's study. Two years later, Warren (1973) noted that several improvements had been made in secondary education in the wake of the Royal Commission Reports. The public examinations in Grades 9 and 10 were dropped in 1971

to encourage schools to take the initiative in improving the quality of instruction and in establishing their own evaluative criteria for promotion purposes. (p. 30)

Teachers could modify and expand courses and experiment with innovations.

The initiation of a system of shared evaluation in 1972 gave further flexibility to teaching. Restrictive teaching practices associated with exams were acknowledged as one reason for this decision, along with a need to recognize the professionalism of teachers. One of the greatest obstacles to innovation was thus partly removed.

Shared evaluation meant that the school would provide fifty percent of the final grade, subject to meeting standards in terms of teacher qualifications, programs, facilities, and support services (Shared Evaluation Handbook, 1980).

The school was advised to

develop a sound but flexible evaluation system, one purpose of which is to develop more creative and effective teaching. (p. 10)

Teachers were permitted to participate in developing evaluation practices in each school. Students were granted access to an appeal process, to the point of being permitted to influence the design of the evaluation procedures. The proposed marking scheme gave more credence to student interest and initiative and discouraged an inflexible practice of averaging marks that allowed no room for adjustment at year's end. Obviously, the student was given the benefit in such an evaluation scheme.

The shared evaluation plan promoted improved teaching methods, programs and school facilities. Schools were provided with incentives to improve teacher qualifications, to expand their course offerings to meet student needs, to build flexibility into their promotion policies, to permit across-grade scheduling, and to pay particular attention to teacher deployment procedures. There is no doubt that the improvements resulting from the competition to participate in shared evaluation remain as significant contributions to secondary education. In fact, the shared evaluation scheme was accepted, with some modification, by the revised senior program in the 1980's.

Warren's Critique

Perhaps the most comprehensive critique of Newfoundland's secondary schools was that of Warren's in 1973. His contention was that secondary education had to undergo major changes. Continuous revision and adaptation were necessary to reflect the tremendous growth of knowledge in existing subject areas, demands for new areas of study in the curriculum to address real issues of the day, and a growing acceptance of the right of every person to an education. Essentially, Warren argued that the curriculum had to be expanded to reflect the provincial Aims of Education written in 1959.

Warren noted two major problems: the lack of a diversified curriculum, and an academic oriented program. An emphasis on the disciplines tended to ignore new areas of study that were being developed to achieve objectives that were not restricted to the disciplines. Because of the explosion of knowledge, the problem of what to learn "requires a vastly different approach from that of the past" (p. 85).

Education had to meet the demand for imaginative solutions to problems. An increase in interdisciplinary projects was noted as one response to such a demand. Although proposals from the discipline's doctrine had resulted in new subject matter, new ways of teaching, and less reliance on textbooks, these had fragmented the curriculum by concentrating on isolated courses and

ignoring the total curriculum picture. Also, there had really been no changes in a basic program that was still restricted to the traditional courses.

Warren noted some efforts to meet the needs that he had identified. Independent study was tried at St. John's, Gander and Wabush. The intent was to give students a chance to try their problem-solving abilities on new situations rather than relying on textbook information. A few non-academic courses were introduced. A St. John's school participated in a grade eleven course in twentieth century problems. An environmental studies course was initiated at Musgrave Harbour High School. Technical courses were offered to students at vocational school facilities in Seal Cove, Conception Bay and Lewisporte, these later expanded to the rest of the island. While these resulted in a limited expansion of the curriculum for some students, they did not gain widespread acceptance in the province.

After reviewing organizational innovations in education, Warren concluded that the

organizational structure of the Newfoundland high school must be released from the lock-step of time and space. (p. 134)

For example, school buildings should no longer be places where "groups of uniform size are offered uniform lessons according to a uniform schedule" (p. 213). They perpetuated the situation

where teachers work in isolation from other teachers, with few instructional resources other than the blackboard and textbooks. (p. 213)

Needed were flexible and adaptable facilities to reflect new organizational patterns, more open space and fewer self-contained classrooms.

Nevertheless, new teaching techniques and organizational patterns were not accepted in Newfoundland. Any innovations were introduced on a "piecemeal, somewhat unplanned (even haphazard) basis", indicating that the "latent power of the innovative movement in secondary education in Newfoundland is largely unrealized" (p. 244).

In light of these realities, Warren recommended that some basic changes were necessary in secondary education, these to include its functions, curriculum instructional methods, staffing patterns and facilities. The emphasis had to be placed upon experimentation with new programs, new implementation strategies, new teacher training policies, and new evaluation strategies. A network of schools could demonstrate new programs, and Memorial University could develop interdisciplinary programs to aid implementing family living, drug education, consumer education, environmental studies and industrial arts.

To achieve his new goals, Warren suggested that the school organization had to reflect these principles:

- (1) The structure is designed to serve individual students.
- (2) The plan encourages frequent, informal contacts between teachers and students.

- (3) The plan is flexible enough to promote varied and individualized learning.
- (4) The organization itself encourages teachers to initiate, invent and experiment.
- (5) The organization cultivates student participation in the structuring of his own learning.
- (6) Educational purposes are never sacrificed or impaired by the machinery of the organization.
- (7) The organization permits individual choice of programs at that stage in the students' schooling where choice can be exercised most intelligently.
(p. 132)

Such an organizational change implied a wider range of courses oriented more to the Aims of Education, emphasis on critical thinking skills in the classroom, more opportunities for students to learn outside the classroom by studying real life situations, and experimentation with team teaching.

In short, Warren was recommending the elimination of the traditional grade organization and the substitution of a credit system as the major revision to accommodate changes to meet the challenges of the 1970's.

The Task Force on Education

Warren's recommendations were given political clout by the Task Force on Education (1978). Crocker and Riggs, the principal investigators, interpreted their mandate as an opportunity to improve school programs to reflect

public concerns and advances in curriculum and organization.

The challenge was to achieve a balance in the curriculum between demand for a broader program and the realities of traditional school organization. The public was requesting more input into schools, particularly by demanding relevance in the curriculum. Teachers were pressured by "external sources to teach more and more subjects" (p. 99). For example, public forums stressed the need for more Newfoundland and Labrador content in the curriculum. A curriculum with a restricted range of options did not emphasize life skills and practical matters.

On the other hand, the public was concerned about the large number of subjects that created a "very crowded curriculum with considerable pressure on the available time" (p. 99). There were as many as twelve subjects per grade. Obviously, the existing curricular structure could not accommodate an expanded program to include social problems.

An academic orientation in the senior grades restricted curriculum and teaching practices. The timetable was taken up with the basic disciplines that still bore the mark of the disciplines curriculum movement of the 1960's. A person could go through his entire school career without dealing with the topics or issues he would face as a citizen. The concern was that

the study of the disciplines in the traditional ways does little to help the individual confront the problems of living in our highly complex society. (p. 116)

Unfortunately, the discrete disciplines did not deal with such issues.

Crocker and Riggs concluded that the Aims of Education were not being realized through the traditional curriculum. It was very difficult to see how, for example, the aim of intellectual development

is fully accomplished by the existing curriculum and by the approaches used in teaching the curriculum. One has only to peruse the public exam papers to find that the emphasis in the curriculum remains almost entirely at the level of knowledge. (p. 115)

Curricular approaches were needed to meet some of the aims that "heretofore have been merely abstract statements" (p. 117). Many areas of social and intellectual concern were "not always identifiable with academic subjects" (p. 127). Some of these were related to economics, politics, technology, industry, communications, social institutions, and current problems. What was needed was a firsthand experience outside the classroom rather than an initiation into the disciplines.

What was lacking was a developmental plan that would prevent piecemeal additions to the curriculum and alleviate the overcrowded program. Most schools still offered a limited program, especially smaller schools with their staffing and facility restrictions. High schools were tied to the disciplines and reflected a grade

structure that prohibited innovative arrangements. A curricular approach had to be developed that could remove schools from the constraints of the disciplines but continue to uphold the general aims of education.

The study could see no point in stressing a program addressing social or individual concerns totally at the expense of the disciplines. Instead, Crocker and Riggs idealized a partnership, because

we can see no viable alternative to the use of the academic disciplines as the core of the secondary school curriculum. To do otherwise would be to deny the place of the disciplines as the culmination of the intellectual achievements of the civilized world. (p. 122)

The problem was where to get time to do all the subjects without detracting from the basic subjects.

A credit system was recommended to replace the grade system. Students could select courses at different times in their high school years without reference to grade levels. Complementing this system would be block scheduling, greater flexibility in sequencing courses, provision for subject promotion in every school, and individual timetabling to reflect student interests rather than the administrative convenience of the school.

The Emergence of a Reorganized Secondary Program

Secondary education in Newfoundland entered a new era in the early 1980's with a completely reorganized senior

program. Indeed, the revised program was the culmination of all recommendations made since the early 1960's. All aspects of schooling were examined extensively and attempts were made to counteract problems in the traditional curriculum. The new program altered the entire perception of a student's educational experiences by challenging assumptions in traditional high schools.

The Advisory Committee Report (1978) established the principles for the revised program. Members examined four schools and discovered that, although new courses had been added, the time element had remained the same, resulting in only "an illusion of a broadened curriculum" (p. 69).

The new program proposed options, independent study, and greater stress on curricular coherence and balance. Administrative arrangements recommended included individualized programs, flexible scheduling, a guidance support system, and a new evaluation scheme. A conversion from the grade accreditation system to a credit system was recommended as the major organizational change.

The Report of the Sub-committee on Curriculum Reorganization (1979) described the proposed program. Three areas of concentration were identified as broad categories of objectives to reformulate the Aims of Education into a functional curriculum. Content-specific objectives could be achieved through specific courses. Objectives not contained within any one course required attention from the entire curriculum. Objectives such as

attitudes and values depended on an appropriate school climate.

Accordingly, the credit system corrected a deficiency whereby courses were simply founded on the disciplines or tried to assimilate too many objectives. As the sub-committee explained:

The clarity of purpose inherent in the system proposed will provide the definition needed by the teacher by identifying any redundancy in both student and school programs, and simplify the problems of equating various courses. (p. 5)

The senior program could exhibit a sense of coherence and balance only when all courses were related to objectives determined by the Aims of Education. (See Appendix B: The Aims of Public Education for Newfoundland and Labrador)

Many objectives obviously crossed subject boundaries. Fundamental skills, critical thinking, and democratic ideals really belonged to all subjects. All courses can reflect a cultural perspective. Courses on contemporary problems like environmental issues and consumer protection can present an interdisciplinary perspective. Thus, along with the traditional courses that satisfied the content-specific objectives, there were courses to satisfy social and personal needs.

Finally, the report recognized the interrelationship of subjects as a natural occurrence when teachers devise creative teaching strategies to accompany new courses. Aspects of art could be woven into other courses:

communication arts under English, Newfoundland art under social studies, and environmental arts under Newfoundland culture. Aspects of home economics and industrial arts could be integrated into a fine arts course to reveal commonalities in artistic expression. Interdisciplinarity had gained limited favour in the curriculum.

The Advisory Committee Report established the principles for the revised program; the Sub-committee Report described its parameters; The Handbook for Senior High Schools of Newfoundland and Labrador (October 1, 1980) prescribed a balance in the curriculum.

The program attempts to achieve a balance in the curriculum among reasonable academic expectations, student interests and abilities, and society's demands for relevance and accountability. A broader range of courses and the credit system provide sufficient choice and flexibility in the program to reflect all of the aims of public education in Newfoundland. The crowded, stagnant curriculum of the past is replaced by one that responds more readily to pressures for the inclusion of extra topics in the program.

In fact, precedence is given not to administrative convenience but to students. The school is to operate in the best interests of its students. Objectives derive from a "professional interpretation of the requirements placed on the school by its clients" (p. 9). Obviously, a

suitable operating climate would reflect student needs in all facets of school life.

To achieve these new priorities, schools are encouraged to develop and implement more creative approaches to their programs. Three year implementation strategies help schools to maintain a basic program while also providing sufficient flexibility to expand course offerings. Courses are added or deleted, scheduled in semesters, taught concurrently, or offered in alternate years. Schools can enrich their curriculum by using non-traditional scheduling practices. In any event, flexibility is a viable educational goal in the program.

An added innovative feature of the new program is the incentive for local school board input into the curriculum, restricted by the inflexibility of the old senior program. Boards, in conjunction with teachers and with the approval of the Minister of Education, can now take advantage of opportunities to expand programs to better reflect local interests.

Non-traditional administrative arrangements are possible in schools because the standardized class no longer dominates teacher deployment, the design and use of school facilities, student grouping practices, and evaluation policies. Innovations in team teaching, variable student groups and other scheduling experiments such as blocked scheduling are now encouraged as legitimate aspects of the curriculum. Schools are also

freed from the restrictive conformity imposed by external evaluation. Grades and mass-imposed subjects are replaced by individual student accountability, with the onus on the school to deliver an imaginative new program with less reliance on tradition.

It is within this context that secondary education in Newfoundland has undergone a dramatic change. This atmosphere of innovation is very conducive to change in the curriculum, administrative policies, and teacher practices in the classroom. Educators have been presented with significant opportunities for the development and implementation of an interdisciplinary approach to education.

Current Interdisciplinary Potential in Secondary Schools in Newfoundland

The revised program exhibits an interdisciplinary character. The potential for an expansion of the interdisciplinary approach to education is evident in the program description. All teachers are to assume responsibility for any objectives that are to be incorporated into the entire curriculum. Clearly, the school is expected to initiate instructional strategies to facilitate the teaching of goals such as democratic ideals, moral values, intellectual maturity and fundamental skills which are not contained in a subject or even in a department in the school.

The Handbook (1980) provides the justification and the preliminary information for initiating the interdisciplinary approach in the senior program in Newfoundland's schools. It gives examples of interdisciplinary activities as well as discussion topics to encourage teachers to consider seriously an interdisciplinary approach to teaching as a viable component of the revised program.

This component is identified as Category B intentions. These contain objectives which are not subject or content specific because they deal with important educational intentions which are not the sole responsibility of one course or subject. They are built into the curriculum in appropriate places and "realized primarily in the development of suitable teaching approaches" (p. 9).

For example, although clearly the main responsibility of the social studies, democratic principles ought to be taught and practiced in every subject as opportunity might arise. Moral values could be explored in all subjects to give students an appreciation of their own values and social ideals. All subjects can deal with moral issues as they arise in the study of the course. Christian principles are to become part of many courses:

While courses in religion would be expected to make this a major aim, it should be expressed in English literature - by examples from fiction and non-fiction; social studies; health and home economics, by discussion of principles of family and other social situations; and science - by

recognition of scientific theory and Christian belief. (pp. 12, 13)

In addition to principles and values, intellectual maturity could be promoted in every subject. Because the former, along with critical thinking, is the main pedagogical thrust of the high school program,

every subject in the high school program should promote the intellectual development of the student. The ability to think cannot be limited to any subject or range of subjects. (p. 13)

Similarly, concepts related to emotional health could be incorporated into the curriculum:

Subjects such as health, physical education, family studies, religion, and literature should have objectives relating to a better understanding of emotional development. (p. 13)

Again, being of an interdisciplinary nature, these objectives would require effective teaching approaches to include them in several subjects.

The use of leisure time is another important interdisciplinary objective. Every objective apparently could address recreational opportunities for students. Some of these are reading and theatre arts in literature, hobbies in industrial arts, cooking and crafts in home economics, rock collecting in geology, and both appreciation and performance in art and music. All courses are required to include provision for the development of avocational interests and skills. Another interdisciplinary prospect is thus evident in the recreational aspects of all subjects.

In addition, all courses are to reflect student vocational abilities and interests by devoting some time to the study of related careers. Subjects exhibit the expert career skills peculiar to them, and students are expected to develop an appreciation of the social values of the types of work involved with these skills. Thus, language reveals the skills of the writer, science teaches the process skills of the scientist, art and music involve unique production and performance skills, and the social studies rely on specific research skills for their information generation. A career-oriented curriculum is interdisciplinary. The onus remains with the schools to identify such skills and to devise teaching approaches to incorporate them into all subjects.

Another area of interdisciplinary focus is fundamental skills, including the basic literary skills of reading, writing and computation as well as study and research skills needed by all students. The revised program is an acknowledgement that every subject has a responsibility for these objectives and that all teachers should be concerned with such objectives as reading in the content areas, the quality of student language, the development of study and research skills, and the suitable layout of assignments. Student attitudes towards school work are of equal concern to all teachers and could not be delegated to a subject or a single teacher.

Of course, some subjects are expected to be more skill-oriented than others:

The degree of emphasis on a particular skill should be dependent on its usefulness to the subject concerned: for example, the science program would be expected to promote mathematics skills to a greater degree than would the social studies program. (p. 14)

Nevertheless, teachers could reinforce each other's efforts by re-emphasizing where possible the development of fundamental skills among students.

To ensure that all teachers are alerted to objectives that are not content-specific but interdisciplinary in nature, all course descriptions incorporate references to moral values, Christian principles, and career possibilities. For example, a specific objective related to the development of moral values is included in most course descriptions. Critical thinking goals are incorporated into all course descriptions. Wherever feasible, study and research skills and career related information are also mentioned in the descriptions.

Since education is expected to incorporate all of the objectives derived from the Aims, an interdisciplinary approach to the senior program is both feasible and necessary. Course descriptions are instructional and planning guides for the devising and implementing of interdisciplinary projects, but also, most importantly, major incentives for educators in considering more creative approaches to meet program demands. The

potential for an interdisciplinary approach to teaching is a significant aspect of the new senior program.

A Skills Approach to Interdisciplinarity

The development of fundamental skills in the senior program presupposes a skills approach to interdisciplinarity. Basic skills in language, critical thinking and problem solving are very important to achieve the intellectual level of competence expected of all students by the Aims of Education. Skills are supra-subject, permeating all subjects in the curriculum. Each category of skills can serve as an organizing principle, or focus, for an interdisciplinary approach in the classrooms of Newfoundland.

In spite of popular opinion, language skills such as reading, writing and listening are not the sole prerogative of the English teacher. In fact, all teachers should draw on general language skills, because language is tied to all facets of the learning process irrespective of discipline boundaries. Language functions in all learning because of its relationship to thinking and reasoning. Appropriate methods must help students to consolidate common elements that language shares across the curriculum.

Historically, rhetorical eloquence was a characteristic of language that superseded all disciplines (Ruszkiewicz, 1982). The forerunners of a unified

language skills approach to learning included Aristotle, Cicero, Augustine and Bacon. The art of rhetoric served both reason and imagination, enabling the arts and sciences to support mutual efforts to communicate clearly and effectively. Of course rhetoric has been divorced from all disciplines except possibly literature.

However, a modern version of rhetoric unites the disciplines under holistic language skills. The most prevalent and productive of these language skills is writing as an aid to critical thinking and reasoning in all subjects.

Hamilton (1980) discussed an interdisciplinary skills program that functioned independently of high school subjects to expose all students to writing activities. Skills were presented exclusive of subject content, showing students the truth of the premise that writing "roots itself in each study" (p. 781).

Savers (1984) described an interdepartmental language skills program involving social studies, English and science teachers. The departments identified study, reading, writing and thinking skills and sequenced them to support all three subjects. A flow chart indicated which skills were selected, the departments responsible for these skills, and a time frame to achieve the skills. A cooperative skills program successfully spanned three high school subjects.

Holistic language skills link many disciplines. Hartman - Haas (1982) concluded that basic language skills underlie learning in all subjects. These skills are dependent on more fundamental intellectual skills such as the ability to think. A discrete skills approach

is likely to perpetuate the compartmentalization of these intellectual skills, thereby limiting their potential applicability and effectiveness.
(p. 3)

Students must develop and apply language skills in a broad range of contexts if they are to understand that all disciplines contribute to communication skills.

The writing process is important in all subjects. A school writing program ought to encourage writing experiences across the curriculum. Naturally, English teachers are expected to initiate such efforts. Judy (1980) commented that the English teacher who permits students to submit reports on history books or who accepts a science project for a term paper is demonstrating concern for writing in other subjects. However, to achieve any degree of success and acceptance, language skills must be incorporated throughout the curriculum by teachers of all subjects.

Perhaps the most neglected aspect of language teaching has been the expressive mode of writing. Expressive writing is deemed to be the responsibility of the English teacher. Freisinger (1982) was concerned that most teachers stress transactional and functional language. He advocated starting in all subjects with the

expressive mode of language. The benefits would include a more creative, critical exploration of language that could enable students to think abstractly and to synthesize information more readily. These skills are indigenous to all disciplines.

According to Peterson (1982, p. 15), expressive language "constitutes the heart of the learning process of any discipline". Styles and Cavanagh (1980) agreed that expressive writing should be integrated into all courses. Only then would the curriculum guarantee a balanced approach to language skills in all subjects. Teachers in all subjects must be willing to experiment with expressive writing so that students will produce a variety of forms of writing in addition to transactional writing.

Furthermore, students in all subjects need opportunities to cope with a complete range of question types and problem-solving strategies because language responses are central to any intellectual reasoning. Factual, judgmental, divergent and convergent questions must be incorporated into any language policy across the curriculum (Hamilton, 1980). All types are focused when students rely on the thinking processes that are applied to problem solving across the curriculum. Interdisciplinary writing develops student awareness of problem solving as "a common ground for all disciplines" (p. 782).

Obviously, there is sufficient incentive and reward for interdisciplinary writing activities among subjects that share interests and skills. English and biology have benefited from joint projects. Carlisle (1978) described a course designed to teach writing to science students by concentrating on the common features of English and science. Calais-rese (1982) designed a project in biology that used expressive writing to observe, record and analyze data on the human hand. Science shared with English the skills of observation and analysis. Writing was a tool that was easily transferable to biology.

This conclusion is supported by other English and biology teachers who merged their talents to give students opportunities to examine common objectives. Ross (1978) described a project that taught writing principles to biology students. The English teacher evaluated submissions for form and presentation; the science teacher, for scientific content. Bennett (1980) taught his students scientific principles in conjunction with a variety of expressive writing exercises to reinforce the skills of observation and classification. Seeberg (1980) designed units of work which combined biology and language skills of abstracting, classifying and labelling data. Activities such as these promote clear thinking strategies and problem solving skills that are common to both subjects.

In that regard, journals and logs are tools to facilitate interdisciplinary writing activities. Hamilton (1980) advocated science journals to provide a balance to the functional, logical responses expected from science students. Expressive writing in journals permits personal and imaginative responses to science and helps students to practice scientific skills of recording, classifying and analyzing data in meaningful, relevant situations.

Fulwiler (1982) agreed that journals and logs in science and geography can add an expressive dimension to these subjects and promote the skills of observation and analysis. Therefore, students in all subjects need opportunities to personalize knowledge and skills across the curriculum.

These English-science writing projects are typical of interdisciplinary approaches that stress the commonalities across the curriculum. Logical thinking and problem solving are "common denominators" for the sciences and the humanities (Wallace, 1980). They bond with all subjects as skills necessary for a broad, integrative perspective on learning.

Hursh, Haas and Moore (1983) concluded that cognitive functions such as recognizing and defining problems, analyzing the structure of arguments, and assessing the relationships of facts are not discipline-specific. Students must have opportunities to exercise the skills of comparison, contrast, and synthesis across the curriculum

to give different perspectives on the same issue or problem.

Interdisciplinary approaches to skills develop student intellectual resources necessary for dealing with unpredicted and ambiguous problems. Eisner (1984) wrote of the importance of intellectual independence to students as they formulate and cope with problems across the curriculum.

Golding and Poad (1973) explained that intellectual independence is a product of creative problem solving strategies that apply generic skills from the disciplines to realistic problems. In fact, an "impressive list of overlapping and identical aims can be drawn from the subject areas" (p. 25).

Newton (1979) suggested that Bloom's taxonomy of skills should serve as the foundation for an interdisciplinary program that stresses the sameness of the intellectual process in all disciplines. Analytical and intellectual skills are common to many disciplines, because

the underlying process of intellectual development is fundamentally the same irrespective of the discipline to which it is applied. (p. 289)

Skills could be superimposed on the existing curriculum to highlight the inquiry process of all disciplines.

Intellectual skills can integrate the perspectives of mathematics, biology, art, literature and religion in a study of four modes of inquiry (Savage, 1982). These

modes are observing and describing, making and breaking patterns, making judgments, and stating and solving problems. Students were involved in a study that went beyond the capabilities of any discipline.

Tooke (1975) utilized creative problem solving strategies to unify high school subjects as diverse as music, literature, biology, physics, mathematics and geology. For example, students focused on concepts from the point of view of different subjects. They explored seemingly opposed subjects such as poetry and mathematics to identify shared qualities such as precision, the use of images and the development of meaning through context. Furthermore, they studied general ideas that exist in the arts, sciences and humanities. Students experienced creative thinking by applying generic problem solving skills to all subjects.

Obviously, subjects not traditionally linked in Newfoundland's senior program share common language skills, intellectual objectives and problem solving strategies. Mathematics and science can contribute methods, as language can contribute skills, to consumer education or cultural heritage studies. Gathering and interpreting information occurs in each of these subjects. Environmental education can unify the sciences and humanities by focusing on international problems and ways of finding creative solutions. All these skills are included in the senior program as essential to

implementing the array of objectives determined by the Aims of Education.

Unlike high school teachers, elementary teachers in Newfoundland are given incentives to develop a language policy across the curriculum. Language Growth: A Teaching Guide for Writing Instruction in the Elementary School (Department of Education, November, 1982) contains information on the role of language in critical thinking, logical thinking and problem solving. All teachers are encouraged to teach writing across the curriculum, including the writing process, expressive writing, an analysis of question types, and the importance of language to learning in all subjects. The guide provides tools for educators to determine current language usage across the curriculum and to develop and implement a school wide language policy. This publication is an invaluable source of ideas for high schools interested in implementing language programs similar to those described by the writer.

However, all skills will remain as educational pronouncements, never really functioning in the curriculum, unless teachers and administrators are fully aware of the importance of policies which include skills in all subjects and are motivated to incorporate these policies across the curriculum.

A Thematic Approach To Interdisciplinarity

Themes are the most commonly used organizational patterns for interdisciplinary studies. Lucan (1981) decided that a thematic approach is very appropriate to interdisciplinarity. According to Johnson (1980) themes can easily interrelate many subjects in a program of interdisciplinary studies.

The use of themes that cross subject boundaries was illustrated by Humphreys, Post and Ellis (1981). They designed a methodology for the thematic approach, including advice on how to select themes, develop subtopics and then relate these to content from the disciplines.

Beck (1980) noted that appropriate themes range from apparently insignificant topics to those of national importance. These include objects, processes, events and recurring concerns. For example,

the simple question of why sunglasses are worn may involve eye pigmentation, paranoid tendencies and social-class norms, suggesting ties with biology, psychology, sociology and anthropology. (p. 28)

By contrast, Linski (1977) listed themes that have been historically common to all societies regardless of time or geography. These "Cultural Universals" have been used to unify curricula:

| | |
|----------------------------------|------------------|
| art and architecture | geography |
| economics and industry | history |
| family and social organization | philosophy |
| government and political science | religion |
| language and education | conflict and war |

investigated from the perspectives of the sciences and the humanities. Switzer and Voss (1982) argued that the sciences and social sciences unite to form common modes of problem solving for the "key value questions so prevalent in our modern world" (p. 455).

Likewise, Glenn and Gennaro (1975) argued that interdisciplinary studies must involve the sciences and the humanities in a discussion on value questions that permeate our society. Some of these included:

| | |
|---------------------|---------------------------------|
| pollution | hunger |
| drugs | population control |
| racial prejudice | abortion |
| socialized medicine | euthanasia |
| aging | impact of technology on society |
| evolution | human experimentation |
| genetic engineering | consumerism |
| energy crisis | biological and chemical warfare |

Regardless of the scope of a theme, any thematic study has a broader base than the disciplines. Studies range from composite disciplines that draw concepts and skills from other disciplines to original arrangements of content to fulfill specialized mandates. Beauchamp (1983, p. 92) noted the increasing tendency to create school subjects from "conventional wisdom" as well as the "application of selected portions of the disciplines to applied areas of our culture". Thematic studies are not derived from nor confined to the puristic disciplines.

Consequently, a variety of subjects are not structured on the discrete disciplines. Sayler, Alexander and Lewis (1981) described three types of school subjects. First, there are subjects that are simplified versions of

The study of these themes developed a comprehensive gestalt of all cultural, social and national entities.

The National Association for Core Curriculum listed possible topics generated by high school teachers who were interested in designing interdisciplinary programs.

| | |
|---------------------------|------------------------|
| conflict | computer literacy |
| consumerism | justice |
| heroes | disarmament |
| safety | ecology |
| patriotism | the future |
| nutrition | energy |
| jogging | world trade |
| multicultural education | power |
| economic understanding | employment |
| family | drugs |
| sex | environmental concerns |
| conflict/cooperation | energy |
| personal/social relations | |

An illustrative unit on personal/social relations included these subject areas and topics:

| <u>Subject Area</u> | <u>Topic</u> |
|---------------------|----------------------------------------------------------------------------|
| social studies | - role definition citizenship ethnic backgrounds family relations |
| foreign language | - role of language in our lives |
| mathematics | - role of economics |
| science | - patterns of social groups |
| English | - communication skills |
| reading | - leisure-time activity |

While some themes may utilize only the sciences or only the humanities, others involve practically all subjects. Many of the value questions in society must be

mathematics and science. These utilize aspects of these disciplines to deal with practical, consumer oriented studies. Second, there are subjects that reorganize content from the disciplines into designs involving social and personal concerns. Third, there are unique organizations of content dealing with extra-disciplinary themes. These include studies in specialist areas such as business, health, and family life.

The basic premise of these studies is that the disciplines are inadequate to deal with many educational concerns. The disciplines reflect the clear design and internal order of an epistemological orientation, and not the instrumental orientation of studies organized around themes. School subjects do not mirror disciplinary interests, being essentially "rough and ready demarcations of teaching activities" (Pring, 1976, p. 11).

Social studies courses typify thematic, interdisciplinary subjects. The need to integrate the social sciences around social concerns became evident in the late 1950's (Herbst, 1983). The emerging social studies curriculum used a thematic approach to reveal the interrelationships among disciplines when they are applied to socially significant topics.

Cultural heritage studies, provided within the context of social studies, involve a number of significant topics for interdisciplinary investigation. Themes examine aspects of culture through selected content and

skills from the disciplines. The fullest understanding of culture is derived from considering the relationships of many subjects, with these perspectives focused on the whole spectrum of human achievement. Literary, scientific and artistic achievements are important to cultural heritage studies, whether on a national or regional scale.

Canadian studies courses are exemplifications. Stamp (1980) described efforts in Alberta to give students an opportunity to study their country in its many dimensions. Teachers developed an interdisciplinary framework and a series of lesson plans for a Canadian studies course on the theme of national identity. Students explored a series of topics from the perspectives of different disciplines.

Bailey (1975) wrote about a Canadian studies course in a British Columbia school. Designed to give students exposure to Canadian cultures, the course used four subthemes: native culture, French Canadian culture, English Canadian culture and ethnic cultures. Concepts were selected from history, art, geography, drama, music, industrial education and French to provide a background to the social milieu from which these cultures emerged.

Newall (1979) and Underhill and Telford (1980) described two Canadian studies courses in Ontario. The first, entitled "The Canadian Experience", examined regions of Canada from the perspectives of literature and history. The second was also a regional analysis of

Canadian culture. Students were introduced to concepts from the disciplines that related to their total experience of culture.

Any cultural heritage study needs to develop an awareness of history and an appreciation of literature. These dual perspectives help students to realize the complexity of their heritage. Dancy (1982) argued that any history of a period must include its literature, music, art, technology and health. History is "the natural link-subject for excellence" (p. 22).

Literature and history are complementary and therefore natural links for cultural study. Berard (1983) proposed that the two subjects be integrated in a survey of cultural history in Nova Scotia. All teachers were encouraged to incorporate literature into Canadian history to involve students in a form of historical thinking that traditional history courses could not.

McPhee (1984) noted the efforts to introduce regional studies into schools in the maritime provinces. A course was designed as an interdisciplinary study of all aspects of maritime life:

economics, industry, transportation, history, culture, politics, geography, business and the contemporary and emerging issues of society. (p. 35)

The objective was to give students an accurate and balanced perspective on maritime living.

Opportunities are also being given to Newfoundland's students to study meaningful cultural experiences through

an interdisciplinary perspective. The most recent addition to cultural studies in Newfoundland is a Labrador studies program implemented by the Labrador East Integrated School Board (The Evening Telegram, January 2, 1987). The program, consisting of supplementary units to the regular social studies curriculum, addresses concepts within a Labrador context to help students become aware of their unique Labrador life style.

The interdisciplinary quality of cultural studies is exemplified by the Newfoundland culture course, Cultural Heritage 1200. The textbook, Our Newfoundland and Labrador Cultural Heritage (Matthews, Kearley and Dwyer, 1984) borrowed readily from numerous social sciences and the humanities to reveal to students the complexity of their personal and social identities. Although Newfoundland culture is presented within an historical context,

geography, anthropology, sociology, political science, folklore, and literature are drawn on as needed, in order to sketch a comprehensive picture of the Newfoundland way of life. (Kearley and Dwyer, 1984, p. 4)

Disciplines contributed concepts, principles, skills and methods of enquiry to a topic of importance to Newfoundland education.

The course is an excellent focus for exploring concepts covered by the social sciences, but it can also help students to identify the connections among all disciplines. Language arts, industrial arts, family

living, science, music, art, and mathematics are all rich with cultural heritage connotations.

Of course, cultural heritage studies require appropriate teaching strategies to be properly implemented. Teachers are challenged to design lessons to actively involve students in experiencing culture in all its expressions. Teachers are advised to be eclectic in their approaches, with the interdisciplinary approach being the most effective.

A team approach draws upon the expertise of teachers in a variety of subject areas, either by team planning and development of interdisciplinary projects or by team teaching in the classroom. Another approach is to select classroom activities that examine issues and themes in such a way as to draw on skills, concepts and knowledge from various academic disciplines.

Regardless of the teaching approach chosen for cultural courses, students in Newfoundland are engaging in research projects, independent study, and the utilization of local resources to supplement curriculum materials and classroom learning.

Teachers of Newfoundland culture are indeed creating interesting and meaningful learning experiences for students. They are increasingly involving students in real life experiences that focus on their local heritage. Students are pursuing their interests in local and regional topics that transcend textbooks, lectures and

prescribed course materials. Texts and expository teaching are being replaced by active student inquiry and student directed learning.

The Grand Falls Advertiser (January 26, 1986) described the sense of achievement and excitement generated among students learning about their heritage. Projects included the construction of a scale model of an old fashioned saw mill and research on Newfoundland's traditional foods. The girl who designed and built the saw mill stated that she had learned more from her research and construction efforts than she would have expected to learn from textbooks in science, social studies and art. Students doing the project on foods learned the principles of health and nutrition, concepts in production and transportation of food, and ancillary ideas from geography, history, sociology and anthropology.

Similarly, the Northern Pen (March 14, 1986) reported on students at Flower's Cove who are learning about cultural heritage with the aid of models. Individual students constructed a coastal schooner, a traditional salt-box house and a vegetable garden. The teacher wanted students to experience the tools, skills and craftsmanship of their forefathers. What is particularly evident in each project is the number of concepts, principles and skills these students gained from their learning experiences.

Students at Griquet are researching and producing a community history, including family histories, the development of local institutions, and regional legends, tragedies and recipes (The Northern Pen, April 15, 1986). Student contributions are being jointly evaluated by the social studies and English teachers. Such projects heighten the relevance of social studies classes and have a beneficial effect on the community.

The relevance and practicality of such projects is further illustrated by a Roddickton student who combined a hobby and a commercial venture to create a traditional Newfoundland quilt as a final examination assignment in Newfoundland culture (The Northern Pen, April 22, 1986). She is one of a group of students interested in revitalizing commercial interest in local crafts. While the teacher graded her assignment on the basis of its cultural significance, any art or home economics teacher could hardly have failed to appreciate the skill and effort put into her artistic endeavour.

The potential of cultural studies for an interdisciplinary approach to teaching was best exemplified by a project at Foxtrap (The Evening Telegram, March 12, 1986; The N.T.A. Bulletin, April 15, 1986). Students researched folk medicine, ghost stories, the seal fishery and local government through interviews, questionnaires and visits to museums. They examined architecture, monuments and gravestones. Traditional

clothing, food, and entertainment were displayed during a "Newfoundland Night" at the school. Students collated recordings, catalogued written assignments, and classified artifacts to create an archive for the community. They learned not only about their heritage, but also about research and writing skills.

These student projects attest to the fact that local cultural studies can be integrated into many aspects of the curriculum. Cultural studies lend themselves to social studies, literature, science, art and, occasionally, even mathematics. The onus remains with the school, specifically classroom teachers, to build on this interdisciplinary potential with creative teaching approaches.

Ideally, teachers must have a broad background in the many subjects that reflect all aspects of culture. They need to be aware of how all aspects combine into an interdisciplinary study of the character of Newfoundland people, as well as to have an ability to synthesize subjects to see the common ground among them.

Therefore, teachers need more than mere exposure to materials to adequately cope with the demands of heritage studies. Due attention must be given to methodologies in teacher preparation. Memorial University offers a minor program in Newfoundland studies which could give prospective high school teachers insight into an interdisciplinary perspective on Newfoundland culture.

Students study culture through a variety of disciplinary approaches that give "general knowledge and significant insights into Newfoundland affairs for those intending to make a career in high school teaching" (Appendix A: Letter to Professor J. Hiller, November 17, 1985).

Hiller acknowledged the need for appropriate interdisciplinary training for teachers of Newfoundland studies, and indicated a willingness during his tenure as program supervisor to offer summer institutes for teachers (Interview, November 18, 1985). Apparently, since no efforts had been made to accommodate Newfoundland studies into the Bachelor of Education degree requirements, teachers lacked incentive to enroll in the program. Teachers with an interest in teaching Newfoundland Culture 1200 could benefit from the program's insights and teaching techniques.

In conclusion, the interdisciplinary thematic perspective is quite obvious in heritage studies because they ideally include the entire curriculum. Because all courses have the ability to give insight into cultural issues and themes, the criteria applied to select any specific cultural heritage study could be used to select content from any discipline.

All subjects portray an historical development of knowledge as a human act to solve practical, social and personal problems. For example, each generation needs to appreciate the impact of science and technology on

society, particularly problem-solving strategies and means of advancing knowledge. The great achievements in the arts and sciences have arisen from, and influenced, cultures in similar fashion. Since man is surrounded by the cultural implications of the natural and social sciences, any study of culture is an interdisciplinary venture that encompasses all disciplines.

A Problem Approach to Interdisciplinarity

The problems of young people and society cut across the boundaries of the separate subjects taught in the conventional secondary school program. Content drawn from several subjects is usually necessary if an individual or social problem is to be understood and dealt with effectively. Some problem areas emphasize strongly the personal problems, interests and needs of individuals. Other problem areas emphasize strongly problems of society. However, most problem areas actually interrelate the needs of young people and social issues because they involve questions of concern to both.

Beane (1980, p. 307) asserted that a general education needed by society must evolve from the youth needs/social problems approach:

Statistics on drug and alcohol abuse, unwanted pregnancies, suicide, and other indications of frustration are evidence that adolescents today face significant problems with which they need help. In addition, social problems such as racism, energy, technology, violence, unemployment, and the like are not only more compelling, but far more real than the problems

posed by school subjects. This does not mean that subject matter is useless, but that it should be organized and used as it is pertinent to real problems of living.

This "requires a genuine rethinking of the high school curriculum" (p. 308).

Van Til (1976) proposed that these problem areas, or centers of experience, should be the focus for secondary education:

| | |
|---------------------------------------------|-------------------------------|
| self-understanding and personal development | family |
| peer group | school |
| health | vocations |
| community living | intercultural relations |
| governmental processes | economic options and problems |
| overpopulation, pollution and energy | consumer problems |
| war, peace, and international relations | world views |
| communication | alternative futures |
| recreation and leisure | the arts and aesthetics |

Earlier, Vars (1969) listed problem areas and illustrative learning units for secondary schools.

| <u>Problem Area</u> | <u>Illustrative Learning Unit</u> |
|---------------------------|----------------------------------------------|
| self-understanding | "Growing Up" "How to Make Wise Decisions" |
| healthful living | "Staying Healthy" |
| personal-social relations | "Achieving Maturity" "Boy Meets Girl" |
| vocational preparation | "Planning My Career" |

| | |
|-----------------------------|-----------------------------------------------------------------------|
| living in the community | "The Outlook for Teenagers in Our Town" |
| intercultural understanding | "Teenagers Around the World" "Beyond Tolerance" |
| democratic government | "The Citizen's Role in Policy Making" "Comparative Governments" |
| economic understanding | "My Role as a Consumer - Producer" "Money Management" |
| world problems | "Surviving the Spaceship Earth" "Ways of Achieving Peace" |

Obviously, most of the problems proposed by Van Til and Vars are within the realm of citizenship education. Actually, the problems approach to interdisciplinarity is most evident in socially significant problems that impact on the lives of individual students. This is the rationale for a proliferating citizenship education.

Citizenship education addresses the problems that perplex mankind. Inevitably, education is pressured to react to the "explosive power of urgent social problems" (Schulmeister, 1975, p. 102). Classroom activities are designed to help students perform as functioning, competent citizens ready and able to cope with current and outstanding social issues.

The concern is that education help create a cohesive civic unity that responds to common problems yet acknowledges a diversity of opinions on these problems. Butts (1973) argued that education must help students to achieve a sense of community. This is aided by "building

a sense of civic cohesion among all the people of a country" (p. 21).

Tompkins (1981) described the response of Canadian education to social pressures for a more and relevant curriculum to address the concerns of society in the 1960's. A combination of the Hall - Dennis Report of 1968 and an intensive review of Canadian studies from 1965 to 1968 resulted in the establishment of the Canadian Studies Foundation in 1970 to re-emphasize Canadian content and to encourage the development of pilot projects in citizenship education. The renewed emphasis on socialization created a curriculum organized around general areas, using flexible facilities and scheduling, but more notably, a problem-solving curriculum.

Education required students to formulate problems and plan projects. They were expected to find and use resources for dealing with social issues. Critchfield (1978) explained that the child centered classrooms of the 1970's used problem solving strategies to promote the key concepts and methods of the social sciences. Studies centered on the civic responsibilities of individuals and the insight gained from participation in real social issues and real problem solving activities.

Humphreys, Post and Ellis (1981) argued for realistic classroom experiences for students. Teachers should involve students in

the solution of real life problems even before they have mastered the skills that are necessary

for the problem's complete solution. Under such conditions, we can expect attitude improvement and renewed motivation. That will, in turn, promote involvement in the development of basic skills. (p. 22)

Maynes and Ross (1984) recommended that schools overtly teach the underlying skills that are needed to analyze social issues. They outlined the interrelated intellectual tasks that are involved in the process of approaching social decisions. These include an ability to focus a problem, to develop a framework for analyzing the problem, to locate and assess the adequacy of information, and then to synthesize all facts into a decision making format. These skills are delegated to students to enable them to solve problems.

But how are social concerns and the accompanying teaching strategies incorporated into education? Teachers and classrooms are typically subject oriented. Milburn (1977) suggested two different curricular orientations for these interests. Issues could be treated as integral parts of disciplines, that is, investigated within a disciplinary context. Thus, issues could be subjected to the methods of analysis unique to history or literature. Equally, a reconstructionist orientation could use issues as organizing concepts and use the disciplines as resources from which content is selected to suit the demands of the issues. The choice of orientation determines how the issue is incorporated into the

curriculum and provokes the development of appropriate teaching strategies.

The reconstructionist orientation guides citizenship education in the Newfoundland curriculum. The current approach of the educational system is to unify subjects within the framework of the subject curriculum, adding new courses to respond to personal and social expectations.

Tanner and Tanner (1980, p. 328) concluded that this was an acceptable compromise to more comprehensive interdisciplinary approaches, because at least these subjects are

significant attempt to modify the subject curriculum by reducing the subject boundary lines in order to enhance the relationships between and among subjects for more effective learning.

Accordingly, as Magsino (1977) commented, the curriculum in Newfoundland schools is basically subject centered.

An expanded and diversified citizenship education component of the social studies curriculum in the Newfoundland senior program demonstrates a commitment to integrate social concerns into the curriculum. This began with a pilot course in twentieth century problems in the early 1970's, later expanded to all schools in the format of a Canadian studies course. Topics that were studied included poverty, labour and minority groups.

That course was a forerunner of current citizenship education endeavours. Canadian Issues 1202 provides an in-depth study of complex problems in Canadian society

(Course Description, February 1982). Topics include energy, resource management, inflation and French-English relations. Students explore relationships among the geographical, cultural, political and economic factors that cause problems and then propose solutions in relevant classroom activities. Flexible scheduling and the availability of course resource materials permit eclectic instructional approaches, particularly creative interdisciplinary techniques.

World Problems 3204 involves students in examining global issues such as population, food, migration, change, industrialization, technology and interdependency (Course Description, February, 1983). Students discover the interrelationships among the geographical, historical, religious, cultural, political and economic forces that shape world conditions. They also learn that insight into world conditions depends on the values, skills, attitudes and concepts combined from many disciplines.

More specifically, Consumer Studies 1203 addresses the consumer in the marketplace (Course Description, February, 1982). Students examine practical consumer problems to develop an awareness of consumer protection. Concepts and skills from consumer mathematics, general science, industrial arts and home economics - all of which are distinct courses in the secondary program - are interrelated in an interdisciplinary approach to a modern social concern.

While these courses provide a means to address selected social concerns, the number of issues considered essential to a comprehensive citizenship education grows rapidly. The possibility for an interdisciplinary approach exists with each local or international issue. Ethical and social issues demand public responses and, subsequently, educational consideration.

Active participation and realistic learning are the aims of classroom activities for a citizenship education of the 1980's. Increasingly conscious that we are part of a world community, Newfoundlanders must participate in the debate on problems facing mankind. Students are more aware of world issues because of the mass media, and they are demanding a voice in real public concerns (The NTA Bulletin, January 20, 1986). The Youth Advisory Council, for example, is sponsoring a drama tour of the province, created to

raise awareness of Newfoundland youth of the problems which young people face today and to start the youth thinking of ways to solve these problems. (The Evening Telegram, July 17, 1987)

Schools are being pressured by a more sophisticated populace to include significant social problems in their programs.

Some of the concerns that are currently competing for inclusion in Newfoundland's citizenship education are women's issues, drug abuse, multiculturalism, war and peace, and environmental protection. All are feasible and

necessary in the curriculum if students are to adequately fulfill their civic responsibilities.

The emergence of the women's movement has created a prevailing political and civic pressure to include women's issues in the curriculum. Two agencies in Newfoundland are encouraging high schools to explore concepts related to feminism. The Provincial Advisory Council on the Status of Women is an effective political voice for women's concerns in the province. The Newfoundland Teachers Association Council on Women's Issues promotes awareness among educators by making available to schools resources for implementing women's studies in the curriculum.

The Council on Women's Issues collates information through the Association's various publications and the Information Centre. Recent materials that were promoted include films on selected women's concerns, a series of booklets on affirmative action policies, a bibliography of non-sexist resources for the classroom, and information for women interested in non-traditional careers (The NTA Bulletin: October 15, 1985; November 15, 1985; January 20, 1986; March 17, 1986).

The Provincial Advisory Council has published an information package to support classroom activities during International Women's Day (The NTA Bulletin, February 27, 1986). It has also made available a valuable guide for high school law or social studies courses interested in

the topic of women and violence (The NTA Bulletin, October 15, 1985). Both publications are available at the NTA Information Centre.

While the incentive exists to include women's studies in the curriculum, the means to do so are not so obvious. House (1979) concluded that there are three ways to approach women's studies in schools. Some high schools use supplementary units as electives. Others merely patch segments of women's studies into other programs. A few incorporate these studies into the entire curriculum.

Dorenkamp (1982) described a women's study course entitled "Images". The course bridged the humanities and the social sciences by involving literature, history, psychology and sociology. Teachers had to overcome their biases and stereotypes to team plan and team teach the course. She concluded that the teachers learned to respect each other's contributions to the topic and that students learned to recognize the interrelationships of the disciplines in women's studies.

Therefore, implementing women's studies depends on the availability of resources, decisions on the extent these studies will pervade the curriculum, and a willingness to cooperate in planning and teaching. Furthermore, some exposure to sample programs can be provided to teachers interested in implementing women's studies by way of a minor program in women's studies at Memorial University. With access to the expertise offered

by women's agencies and recognition from educational authorities, Newfoundland's teachers can design classroom activities to familiarize students with women's issues.

A second significant social problem is drug and alcohol abuse. Since drug abuse is so often a youth problem, responsible young people are calling for an education in the social implications of the problem and a public disassociation of special events with drugs and alcohol. The tragedies of alcoholism are prompting young people to suggest solutions. Most young people can be involved with these issues rather conveniently through school programs.

Provincially, youth groups are initiating alcohol and drug-free school celebrations and events. These efforts are being applauded and encouraged by officials in the Newfoundland Teachers Association, the School Trustee's Association and the Alcohol and Drug Dependency Commission.

A joint project of the Newfoundland Teachers Association and the Alcohol and Drug Dependency Commission, "Safe Grade '87", provides a step by step guide to alcohol and drug free graduations. Filled with testimonials from young people who have held successful drug-free graduation exercises, and promotional suggestions for other schools, the brochure was distributed provincially by the Newfoundland Teachers Association.

To help schools implement drug education, the Alcohol and Drug Dependency Commission sponsors literary and poster contests and works in conjunction with teacher groups interested in drug education. The Addiction Research Foundation support teacher inservice across Canada and provides its own workshop sessions on drug abuse. Finally, the Health Promotion Directorate of Health and Welfare Canada provides brochures and audio-visual presentations on drinking and driving and related alcohol abuse problems. Stressing that schools have a role to play in the issue, one reporter advised that teachers should "incorporate safe grade themes (i.e., drug and alcohol abuse) in their home economics, chemistry, biology, math, law, language, and guidance classes" (Calvin Cosh, The Newfoundland Herald, May 24, 1986).

Thus both the incentive and the means for interdisciplinary activities in drug education are recognized. Of course, drug education was very prevalent in schools in the United States during the 1970's. As with many educational innovations, enthusiasm overshadowed reason and a rather naive audience absorbed programs that were quickly developed and utilized with little planning and co-ordination (The NTA Bulletin, November 15, 1985). Publishers provided kits of materials and teaching guides that treated drug issues rather superficially and ignored the crucial involvement of teachers in implementation and

the active participation of students in solving realistic problems.

Hopefully, educators in Newfoundland responsible for the current drive for drug education will avoid a reliance on easy solutions to implementation and give more substantial help to schools interested in developing curricula in issues related to drugs.

A third social concern that is vying for status in the curriculum is multiculturalism. The cultural character of a society prompts many problems that cannot be solved adequately by the discrete disciplines. Students need the perspectives of various disciplines to make adequate decisions about the complex issues involved in multiculturalism.

Yu (1987) challenged educators in Newfoundland to include multiculturalism in the curriculum. Ideally, this could be achieved by integrating multicultural elements into all subject areas. However, social studies subjects offer the most opportunities because these already include topics such as human heritage, government policies, immigration and refugees, economics and world trade, minorities and race relations. All multicultural objectives can "fit very appropriately into the curriculum of social studies" (p. 25)

One multicultural subtopic that is gaining some prominence in the classroom is discrimination. Educators are being asked to involve students in situations that

duplicate the effects of apartheid in South Africa (The Evening Telegram, May 9, 1986). Sponsored by Amnesty International, the project demonstrated to students the discriminatory restrictions placed on native black people and then involved them in solutions to this very complex problem.

Agencies that promote human rights are sponsoring the development of resources for teachers who want to implement activities on discrimination. The Nova Scotia Teachers Association devised an educational program aimed at giving students an understanding of the concept of indiscrimination. It is available at the NTA Information Centre, as is a booklet provided by the Newfoundland and Labrador Human Rights Association to supplement the social studies curriculum (The NTA Bulletin, March 17, 1986).

Another multicultural topic that is suggested for classroom activities is bilingualism. Resources are being distributed to schools through the Commissioner of Official Languages and the Multiculturalism Directorate of the Department of the Secretary of State. A resource kit entitled "Share the Vision" was recently sent to all schools in Canada. It consisted of original written works by young Canadians, a video, and a study guide to help teachers incorporate activities on bilingualism into English literature, creative writing, social studies and Canadian studies.

These and other topics in multiculturalism are supported by resource materials readily available to schools. For example, the Department of the Secretary of State has distributed a Canadian Symbols Kit to all schools to promote cultural awareness among students. Teachers are urged to integrate the topics and activities into the entire curriculum to instill in students an appreciation of Canada's history and geography, as well as its bilingual, multicultural society.

Finally, efforts to introduce multicultural education are coordinated by the Newfoundland and Labrador Association for Multicultural Education. With the prompting of these governmental and private agencies, Newfoundland teachers will eventually have to respond with classroom activities organized around the concerns of multiculturalism.

A fourth concern that education must address is war and peace. The impetus for peace education comes from many sources. On a student level, Montreal teenagers made the headlines recently because of their cross-country tour to create public support for peace education (The Evening Telegram, January 24, 1987). They argued that issues related to peace have to be given systematic attention in schools. On an adult level, Canada's ambassador to the United Nations stated in a recent speech that all schools must alert students to the problems involved with peace

and security to prepare them to propose solutions to world conflicts (Here and Now, CBC News, April 22, 1986).

War and peace curricula are interdisciplinary. They emphasize problem solving process skills. Bornstein (1974) described an approach to peace education that involved English, social studies, art, music and science. He decided that the issues involved were outside the purview of a disciplinary focus. Students examined and evaluated human aggression from several perspectives and developed tools to apply to problem solving situations on peace and war. This problems approach can be utilized in any classroom.

At least two provincial associations are presently lobbying educators and legislators for the introduction of peace and education into Newfoundland's schools. "Educators for Peace" is calling for an evaluation of the curriculum to determine where issues can be incorporated (The N.T.A. Bulletin, October 15, 1985). In their opinion, students must confront unprecedented problems involving concepts such as stewardship, global citizenship, and the interdependency of the earth and its people. "The Newfoundland and Labrador Animator for Development and Peace" is promoting the distribution of educational kits to help to implement a program stressing global responsibility for third world problems and other international issues (The NTA Bulletin, November 15, 1985).

Further incentive for peace education is provided by an annual International Disarmament Week in Newfoundland's schools. Students are given opportunities to raise questions and participate in activities related to peace. Teachers are encouraged to take an interdisciplinary thematic approach to peace and to provide the information found in existing courses by drawing on materials as needed to develop selected themes. Also, teachers are provided with materials to inculcate skills and attitudes in students to help them to apply learning in the search for solutions to problems. Activities such as art work, films, music, poetry, and case studies provide a worthwhile introduction to peace education.

Catholic schools in particular are advocating peace education activities for students by using the ideas and materials supplied by the Canadian Catholic Organization for Development and Peace (The NTA Bulletin, June 16, 1986). Also, Catholic educators are establishing local committees to give world development issues a higher profile in education.

In that regard, four Newfoundland educators attended the International Institute on Implementing Peace Education at the University of Alberta (The NTA Bulletin, October 15, 1985). They participated in discussions on the theory and practice of peace education, especially an assessment of the curriculum to see where peace concepts could be incorporated. No doubt these educators have

developed invaluable ideas on how to implement peace education in Newfoundland's schools.

The continuing effort to introduce peace education was demonstrated recently by the introduction of a booklet entitled "What's Fair" (The Canadian Red Cross Society, 1985). Students are encouraged to study the Geneva Conventions, the principles developed to protect innocent victims of warfare. The aim is to involve students in active discussion on the implications of warfare to help them to understand and cope with the issues. Students research aspects of warfare and write their own rules of conduct to guide warfare in a humane manner.

Any initiatives to introduce peace education will tax the teacher's creative classroom strategies. Student activities to teach peace will require new techniques and new materials. For example, a group of junior high students used creative dance and drama to integrate peace issues into their curriculum (The NTA Bulletin, October 15, 1987).

In another case, teachers at St. Bernard's High School, Fortune Bay, initiated a class project on the issue of nuclear war. Students went beyond the classroom activities to form a concerned citizen's group to publicize their own concerns (The Evening Telegram, November 28, 1985). The teachers decided that only extraordinary diplomacy from world leaders of the future can prevent destruction, a concern that can hardly be

addressed by a single discipline. Social studies, science, industrial arts and literature were coordinated to reflect different perspectives on a variety of themes. The group, "Students Against A Nuclear Environment", expanded its class project to include correspondence to media and any interested parties in its efforts to involve the general public.

Opportunities for duplicating these projects exist across the province. With 1986 declared the International Year of Peace, the Department of National Defence distributed a Peace and Security Information Package to all schools. The kit contains ideas for teaching peace issues in current events, history and all related subjects. Furthermore, a Speakers' Bureau can supply expert resource personnel on peace issues. Finally, the National Film Board has compiled a list of films for peace education and a list of peace organizations that can supply materials to use in classrooms.

To give additional aid to teachers of peace education, a series of inservice workshops is being arranged across the province (The NTA Bulletin, June 8, 1987). Teachers of religion, social studies and English will learn how to use the "infusion method" for incorporating peace concepts into appropriate segments of the existing curriculum. The workshops, sponsored partly by "Educators For Peace", are being conducted by two experienced teachers from the Fordham Center of Education

for Peace and Justice, New York. Provided with these supports, Newfoundland's educators have few reasons to ignore peace education in all schools. Obviously, schools will eventually have to react to such pressures and incorporate peace education into the curriculum and into daily activities of students in the classroom.

Environmental education, like peace education, is an international issue of some importance that is striving to become a "vital, growing part of the school curriculum" (The Evening Telegram, February 28, 1986). The impending development of the off-shore oil industry, along with the growing public awareness of its implications, particularly the environmental hazards, makes environmental education of great significance to education in Newfoundland.

Environmental problems must be studied through the convergence of the perspectives of several disciplines. Moroni (1978) argued that the best way to tackle environmental questions is through the interdisciplinary approach. The approach stresses the unity of the phenomena related to complex environmental problems, with concepts drawn from disciplines and modified into an original pattern.

Johnson (1983) concluded that environmental education is an integrating factor for the sciences, the social sciences, and the humanities. All subjects can contribute to man's understanding of his relationship to a forever-changing environment. Environmental education is not a

subject so much as "a pattern which connects mankind to a global environment" (p. 42).

Environmental Education: A Catalogue of Resources (Alberta Department of Education, 1983) defines environmental education as "a dimension which encompasses all disciplines, touching on both man-made and natural environments" (p. 1). This is a process which involves an array of subjects interacting in numerous ways.

A curriculum model was developed that displays the relationships of objectives, concepts and skills from all the subjects in Alberta's curriculum. All are related directly or indirectly to the goals of environmental education. The model skillfully accommodates environmental issues into all existing courses, so teachers can limit their input to single subjects or expand into as many subjects as necessary to achieve their objectives. The intent was to permit all teachers to contribute to the attainment of the goals of environmental education.

For example, a grade 10 project based on the model utilized a team teaching approach involving social studies, mathematics, English, chemistry, health, physical education, industrial arts, home economics and biology to alert students to the kinds of problems that would face a group of people isolated because of some catastrophe. Teachers identified the content from all courses by

tracing the environmental links to these subjects in the model.

A grade 11 project began with a biology teacher who was interested in involving students in a study of water quality in a selected area of Alberta. The environmental concepts and skills in biology were linked with those of social studies, physical education, mathematics, home economics, industrial arts and language arts. Mathematics provided ways of graphing information, physical education and home economics studied clothing and food required for the project, industrial arts supplied the tools for the study, and language arts involved students in writing and debates on environmental issues.

Finally, a teacher of grade 12 business and law wanted to introduce her students to environmental education. Links were explored in the model between these subjects and environmental education, leading eventually to the discovery of related objectives in industrial education, social studies and science. With the help of teachers from these areas, a unit was developed to address the issues of resource crises, energy conservation and environmental description. The project culminated in a mock trial involving students in studying a real court case on acid rain pollution.

These three projects are representative of the interdisciplinary possibilities of environmental education. With resources like these supplied to

Alberta's teachers, and the prompting of social and educational agencies, Newfoundland's teachers can incorporate environmental issues into the curriculum.

Efforts to introduce environmental studies are being co-ordinated by an Environmental Education Co-ordinating Committee (The N.T.A. Bulletin, December 16, 1985). Originating from a 1983 conference of program co-ordinators and special interest councils, the committee's mandate is to popularize environmental issues, to raise the level of public awareness, and to help develop positive attitudes towards environmental studies through teacher workshops, exhibits of materials, school visits and regular publication of articles in the N.T.A. publications. Committee members are prepared to assist in teacher inservice sessions and the development of appropriate evaluation procedures for efforts to introduce environmental studies, thereby providing the rationale and support systems for implementation.

A basic premise held by the committee is that school programs must help students to acknowledge the interdependence of the environment and all forms of life. Also, environmental education is seen as unique because it should be developed in all subjects of the curriculum. As a way to enrich the existing subject curriculum, it makes subjects more relevant as aspects of each are brought to bear on real environmental problems. This

interdisciplinary quality is central to any program of environmental education.

The Committee fulfilled part of its mandate to publicize the need for environmental education by developing and circulating a questionnaire to teachers in May, 1985 (Walter, 1986). An analysis of the survey indicated that 98 percent of teachers who completed the questionnaire felt that a program of environmental studies ought to be placed in schools. Also, 79 percent saw a need for more environmental education than presently exists in the curriculum. Walter concluded that "teachers clearly see a need for more environmental education in schools of this province" (p. 27).

Furthermore, teachers agreed that topics related to environmental studies should be integrated with existing curricula materials, particularly science, social studies, geography, language arts, art and physical education. Topics suggested were pollution, the role of people in the environment, wildlife management, fisheries, and energy. These are already incorporated into several existing school programs. Therefore, teachers indicated that they did not view environmental education as a replacement for prescribed materials but as a means of supplementing subjects already being taught in schools: "Environmental education would not threaten existing curricula. It would enhance them." (p. 28). While such pronouncements are easy to make and to describe ideals, the realities of

implementation are more difficult to describe and overcome, especially that of agreement on means to integrate environmental education into existing programs.

In fact, teachers identified several problems, including lack of time and funds to develop interdisciplinary approaches and materials. Too, inadequate facilities hamper such efforts. However, the greatest problem is a serious lack of support and promotion for such curricula by educational administrators. Information about programs is not reaching teachers, indicating a need for teacher inservicing through workshops and credit courses. The mandate of the Committee was reinforced with the call for a co-ordinating body to promote environmental education efforts in the province.

There are other sources of inspiration for teachers who want to investigate the feasibility of introducing environmental studies in Newfoundland. The Environmental Education Committee of the St. John's Roman Catholic School Board has sponsored a federally funded environmental study centre on the Avalon Peninsula for teachers who want practical experience in exploring how scientific principles relate to nature (The Evening Telegram, February 28, 1986). The program, started in the 1970's, has advanced to the stage where a curriculum package is being developed for piloting environmental

studies. The ultimate aim is to distribute the package to all schools for general acceptance in all programs.

Special interest groups also encourage educational responses to environmental issues. The Federation of Ontario Naturalists, for example, is distributing high quality materials to schools (The N.T.A. Bulletin, October 15, 1985). Its three kits contain teaching suggestions and activities to cover general concepts such as the balance of nature, foodchains and interdependence. The intent is to increase the awareness of young people about nature and their responsibilities to their surroundings. Such kits are invaluable to teachers who want to experiment with any interdisciplinary project in environmental studies.

Ideas also come from local book publishers with an interest in relevant environmental concerns. Breakwater Books has published a kit of print and non-print materials to help schools introduce the study of a Newfoundland environmental problem (The N.T.A. Bulletin, March 17, 1986). "Getting Along: Fish, Whales and Fishermen" centers on the seasonal entrapment of whales in cod traps and nets. The study encourages a thematic approach, exploring concepts in social studies and science to provide an interdisciplinary perspective on the problem. Teacher guides include activity-oriented lessons and methods for integrating concepts into the existing curricula. Numerous artifacts, photographs, and charts

supplement the print materials. The kit could be adapted and used for senior projects on themes identified in cultural heritage courses, environmental science projects and general science activities. It is readily available, since it was distributed to every elementary school in the province.

Finally, an annual wildlife week, promoted across Canada, focuses educational attention on environmental issues. The goal is to encourage students to cultivate an awareness of man's impact on the wilderness along with responsible civic attitudes towards conservation practices. Activities involve objectives, skills, concepts and vocabularies that span language arts, social studies, science, and art. An interdisciplinary approach is recommended to develop in students an understanding that environmental issues need the attention of all teachers in all subjects.

Some interdisciplinary environmental experiences are being promoted by Newfoundland's teachers. Students at St. Carols, a small northern community, addressed a local environmental issue, the rapid depletion of the forest resources for firewood (The Northern Pen, May 13, 1986). A government survey had shown that public demands had outpaced natural reforestation. The students recommended legal, economic and social solutions, exploring both the human and scientific elements of the problem, because its

complexity demanded creative solutions involving an interdisciplinary perspective.

Of course, many social concerns currently focus on the implications of oil development for Newfoundland. Such concerns do help to set priorities for education, so schools are being challenged to respond to the socio-economic effect of oil on Newfoundlanders. The educational concern with the environmental impact of oil was evident in a project at Holy Spirit School in Manuals (The Evening Telegram, November 28, 1985). The students wondered about the effects of a proposed off-shore supply base at Freshwater Bay, and became personally involved in efforts to preserve the area from pollution. Activities included field trips, research from primary sources, and the preparation of a brief to present to an impact study. Principles in conservation were combined with civic protest to create learning that could not be restricted to (or by) textbooks or subjects. Students were exposed to a relevant interdisciplinary experience in environmental studies.

Similar interdisciplinary experiences are recommended by Environmental Science 3205. The course introduces students to important concepts in environmental education and prepares them to deal with major environmental issues (Course Description, February, 1983). Students explore concepts such as interdependence and relationships, and issues such as pollution, depletion of resources and man's

impact on the ecosystem. Instructional techniques include field trips and case studies. A modular thematic approach permits flexibility in teaching practices and scheduling. Specific course objectives instruct teachers to incorporate cultural heritage components and skills that are relevant to various disciplines. Environmental Science 3205 could stimulate interest in an interdisciplinary environmental education program and serve as a focus for introducing environmental issues into school subjects other than the sciences.

Of course, a substantial effort will be required to clue teachers to methods to teach Environmental Science 3205 properly. For example, a previous attempt to introduce an interdisciplinary science course in Newfoundland's high schools failed (Kirby, 1982). The pilot course, consisting of topic-based modules and an activity approach, was taught from 1976 to 1979. It exposed students to a wider variety of science concepts than would be possible through one or two discrete sciences. However, administrators dropped the course because of a lack of financial and human resources. The greatest problem was the lack of teacher inservice, especially emotional attachment teachers had to their academic training. Teachers were not capable of implementing the teaching methods that matched the objectives of the course.

Essentially, inadequacies in teacher preparation and traditional teacher allocation procedures prevented teachers from the flexibility in attitude and pedagogy needed to teach the course. Teachers, being sub- specialists by training and experience, were not initially prepared to teach a course which spanned several of the traditional sciences. They subdivided the course into its separate subject components and taught each separately. Unless teachers are taught to cope with the special demands of Environmental Science 3205, the course is likely to suffer the same fate.

Fortunately, as with many of the courses in the revised senior program, Memorial University has responded to recent developments in education. Education 3270 was introduced as a complementary methods course to Environmental Science 3205 (The N.T.A. Bulletin, March 17, 1986). The intent of the professional course is to upgrade teaching skills, to introduce environmental issues to teachers and to help them to develop curriculum units to suit their school situations. Teachers are given opportunities to practice the methods necessary to teach the science course.

A new methods course (Education 3277) has been developed especially for teachers with no background in science. Its intent is to enable all teachers to link the concepts of environmental science with the existing curriculum (The N.T.A. Bulletin, May 15, 1987). Teachers

develop specific classroom activities to relate the goals of environmental education to all subjects.

Therefore, Newfoundland's teachers have been presented with the elements necessary to implement environmental education in the curriculum. There is an obvious need to address environmental concerns. Suitable resources are being developed and circulated regularly to schools. Then too, adequate teacher preparation in appropriate teaching methods is available through university credits. What remains as an important factor is the universal recognition and acceptance of environmental education in all courses.

Interdisciplinary approaches encourage and facilitate a comprehensive treatment of complex issues in the classroom and add the flexibility in teacher attitude and teaching practices needed to entice active student involvement in learning about such issues. Therefore, the aims of courses dealing with local or international social concerns are readily attained by students, furthering the ultimate goal of intelligent, inquiring citizens.

Citizenship education, like cultural studies, demands interesting and meaningful learning experiences for students. Today's youth need more involvement with real life situations and less exposure to the remote, uninspiring textbook coverage that was the standard instructional mode of the past. They must explore immediate, practical problems and pursue their interests,

even to the point of proposing independent, tentative (even erroneous) solutions to problems. Lecturing and textbooks must be replaced by an active inquiry and personal quest for knowledge that transcends subjects, teachers and classrooms. All are prerequisites to an innovative interdisciplinary approach to teaching and learning. Civic education permits teaching practices to achieve these objectives, especially the growing interest from teachers in getting students away from the classroom and into the community to address public concerns and issues.

Just as one example, a teacher of Canadian Law at Placentia was interested in showing students the seriousness of a trial, particularly that atmosphere which can only be created in a court scene. The class recreated a trial with a real judge, a real prosecutor, and real surroundings (The Evening Telegram, March 8, 1986). All participants agreed that the experience could never have been duplicated by textbooks or in-class assignments. One student called for "more opportunities to do things like this - to bring things out from textbooks to real life".

All classes of Canadian Law 2104 have access to similar projects, since teachers are given a mock trial kit as a major component of the course. Adaptations are at the discretion of the teacher; as, for example, one in which a teacher of social studies and English correlated a dramatic presentation from his literature course with a

trial scene from his law course. The play came alive to students and the legal principles and procedures became more immediate and relevant. The teacher, a colleague of the writer, had assumed that an interdisciplinary approach was an effective way to challenge his students to actively participate in the democratic system of justice.

As another example, students at Englee, assigned a fictitious case to illustrate the democratic way to solve problems, decided to "attack a real problem": badly needed road improvements in the area (The Evening Telegram, March 8, 1986). Their correspondence to government officials and the media reflected well formulated, logical arguments that covered health, economic and political factors. Students drew concepts from their school courses, including but not limited to social studies, to support their arguments. Their project illustrated quite adequately the essential characteristics of an interdisciplinary approach to learning.

In conclusion, good citizenship requires more than knowledge of the principles of democracy, law and economics. It implies an understanding of one's relationship to world cultures, a responsibility to address contemporary issues, an awareness of current world events and an ability and willingness to help solve global problems. A unified approach, across the curriculum, could effectively stress educational objectives related to

an individual's rights, privileges and responsibilities in society.

Conclusion: A Transdisciplinary Vision

Newfoundland's secondary program is a major revision to the traditional high school structure and curriculum. It entails penetrating innovative changes to students' educational experiences. The compelling request from the 1960's was to examine the philosophy, goals and objectives of Newfoundland's high schools. The challenge was to build flexibility into the program to accommodate the interest of students and society.

Schools must arouse curiosity, stimulate interest and develop a thirst for knowledge among students (Rowe, 1965). It was due time to remove obstacles to educational development to encourage experimentation and change in content and teaching methods.

Accepting these challenges, the Royal Commission reiterated the need to differentiate the curriculum to alleviate restrictive, inflexible practices. Creativity had to be fostered throughout the entire curriculum to permit teaching "which transcends the fundamental processes of given approaches" (The Royal Commission Report, 1967, p. 170).

A later response to demands for continuous curricular review and revision, the Task Force on Education focused public attention on a new thrust for relevant social issues in schools to heighten students' social awareness and to increase their intellectual independence. A crucial aim of education is to teach students how a society functions, because

it is possible to study history or physics in the existing curriculum without ever confronting such basic questions as the lessons of history, the fundamentals of physics, or the impact of science on society. (The Task Force Report, 1978, p. 115)

The emphasis is on the individual and social relevancy, the two major thrusts of the revised program of the 1980's.

These priorities involve all courses in the development of generic skills, cultural relevancy, and social concerns. The present senior program has the potential to enable students to think independently, critically and holistically, to develop important perspectives on heritage themes, and to apply knowledge from all the disciplines toward personally and socially significant concerns. As focal points for this transdisciplinary ideal, skills, themes and problems unite the disciplines into organizational patterns that override the limited capabilities of any of the discrete disciplines.

The sciences and humanities are partners in this transdisciplinary vision, since all are essential to any

investigation of social concerns. In point, mathematics "is necessary for a clear understanding of virtually every area or discipline" (Humphreys, Post and Ellis, 1981, p. 2).

Dancy (1982) reviewed the possible links between mathematics and subjects such as art, music, history and literature. These subjects share a common preoccupation with creative patterns and designs. Pollock (1983) concluded that mathematics shares commonalities of form and style with art and music. Mathematics is a tool that can be used productively in the humanities and social sciences to achieve mutual aims and objectives.

Like mathematics, science is an applied tool because of its ability to contribute to social problems. Science skills such as problem solving, testing, labelling and interpreting data can be used in the humanities to demonstrate that scientists and humanists need each other's cooperation in a common quest for understanding social issues (Bronowski, 1972; 1977; 1978). The exploration of value questions in society is a joint enterprise for scientists and humanists, since citizens use science skills and concepts to carry on interdisciplinary thinking to find solutions to problems (Broudy, 1969; 1972; 1977; 1982). Therein lies the rationale for the search for a "humane science" (Willett and Roy, 1982, p. 33) and a "sensitive science" (Zoller and Weiss, 1983, p. 149).

Mathematics and science courses in the Newfoundland senior program illustrate the potential for interdisciplinarity in the curriculum. General courses in science and practical courses in mathematics deal with the everyday application of scientific and mathematical principles, with content and teaching practices selected on the criteria of social competence and practical problem solving.

General Science 1200 emphasizes real life themes, social responsibility and student involvement (Course Description, March 1981). Six short modules include topics such as kitchen chemistry, the physics of sports, and home electricity. Science and technology are stressed as products of one's heritage to be utilized for man's benefit.

Basic mathematics courses also emphasize a utilitarian view of knowledge. Consumer Mathematics 1202 provides insights into mathematics to help students to cope with problems faced by consumers (Course Description, April 1982). Significant contributions of mathematicians and the historical development of mathematics are considered in the course. Students are encouraged to apply math skills and concepts to other subject areas. Field trips could link mathematics, science, social studies, and career exploration, to incorporate relevant activities into the program. Vocational Mathematics 2202 and Business Mathematics 3202 share similar aims, with

emphasis on generic skills and concepts that could be used in other courses such as General Science 1200, Career Education 3101, Canadian Economics 2103, Business Education 1101 and 2101, and all Industrial Education courses (Course Descriptions: February 1982; January 1973).

Even traditionally abstract science and mathematics courses acknowledge social responsibility. Chemistry includes components that focus on historical and social issues, including potential applications to society and the implications of important discoveries (Chemistry 2202, Course Description, February 1982). Concepts in physics are related to technology, while the discipline is recognized as human endeavor, as an essential part of the history and culture of mankind (Physics 2204, Course Description, February, 1981).

An objective of Advanced Mathematics 1201 is to teach students an awareness of how concepts apply to the behavioral, social and applied sciences (Course Description, April 1982). Students need opportunities to relate mathematics to other areas of the curriculum, and to appreciate the historical significance of mathematics as a human creation. Skills from academic mathematics 1203 are to be applied in problem-solving situations that could involve other subjects in the curriculum (Course Description, April 1982, p. 4).

One rather unique mathematics course bridges the sciences and the humanities (Statistics 3104, Course Description, February 1984). Statistical literacy is a basic competency, encompassing many fundamental skills that are part of other courses. The historical and cultural significance of the course is evident in the use of statistics to examine, interpret and appreciate aspects of society. Also, students could

relate statistical concepts, techniques and reasoning to other subject areas such as science and social studies and real world situations and events. (p. 4)

Projects for the course include a profile of a community, polls of local concerns and the compiling of food price indexes for selected areas of the province. For example, the students at St. Anthony used their statistical skills to poll the town and predict who their new mayor would be (The Northern Pen, November 5, 1985). Such local studies are not restricted to any discipline, but they can cross subject boundaries if necessary to achieve their objectives.

Computer Studies 2206 is a socially relevant interdisciplinary science that gives students the functional computer literacy that they need to meet the technological challenges of modern society (Course Description, February, 1982). The interdisciplinary expectations of the course are clear:

In relation to learning in other areas (e.g., science, mathematics, social studies, literature) overlap will sometimes occur,

thereby providing additional practice; more frequently, varying degrees of both incorporation and extension of information and ideas will take place, providing opportunities to integrate the curriculum. (p. 3)

These opportunities are evident in the objectives and content of the course. For instance, literature assignments and language arts activities could provide a forum for discussing myths about computers. The course obviously extends the possibilities for science and mathematics projects. Cultural heritage themes are suggested: the effect of computers on lifestyles, the current technological parallels with the Industrial Revolution in its effect on society, the negative effects of computers, and the impact of computers on society. All are related to other courses in the curriculum.

Surely this interdisciplinary potential in the mathematics and science programs must be made operational in the classroom in Newfoundland. The possibilities for transdisciplinary activities to interconnect the humanities and the sciences must be acknowledged by educators. Teachers must be encouraged to design classroom methods to sensitize students to the transdisciplinary nature of knowledge.

Students may indeed develop perceptive independent strategies and insights that go beyond the boundaries of the subjects in a quest for meaningful learning. In the process, they can be given opportunities to create and use knowledge to suit their unique purposes, the educational

aim of John Dewey and the Progressive Education Association.

In conclusion, all interdisciplinary activities originate from a framework that includes the goals and objectives of education and the appropriate pedagogy to achieve these goals and objectives. The Aims of Public Education in Newfoundland and Labrador can be best achieved through interdisciplinarity, both as an attitude and as an approach to education.

CHAPTER VI

SUMMARY AND RECOMMENDATIONS

Education in the twentieth century has focused on two complementary concerns. First, classroom experiences assumed an instrumental orientation that took education beyond the mere transmission of knowledge to students. Secondly, a diversified education was developed to help young people to cope with the phenomenal growth of knowledge and a plethora of social problems. Innovative teaching methods and new school subjects served the needs of society and enhanced students' ability to synthesize their fragmented educational experiences.

The disciplines were the foundations for a traditional curricular structure that did not acknowledge the diverse nature of knowledge nor the kinds of debate that society needs if it is to address problems. Therefore, curricular models created to reflect disciplinary interests did not mirror the true, dynamic nature of knowledge or satisfy individual and social expectations of education.

Interdisciplinarity is a viable alternative that can dissolve the close partnership between school subjects and the disciplines and also provide a more coherent, responsive curriculum to suit a modern age. Furthermore, it is a reasonable response to the quest for social and personal relevancy. In fact, teaching subject matter in

new contexts other than the disciplines is the cornerstone of the interdisciplinary philosophy.

The interdisciplinary approach to education provides opportunities to help the individual synthesize his educational experiences into meaningful patterns. Interdisciplinary learning theories postulate that man prefers an inquiry, holistic approach to knowledge. The unified curricula of the 1930's adopted a psychological stance, discarding the logical emphasis of the traditional curriculum. A curriculum founded on this premise permits effective learning because students are given opportunities to use information, not merely absorb facts. Therefore a sense of purpose and satisfaction is evident in education.

These philosophical and psychological themes provided the foundation and framework for the writer's study of interdisciplinarity. In fact, adequate definition of terms involved in the study depended on an extensive analysis of all factors that impinge on the concept of interdisciplinarity.

First, the writer has reflected on the historical precedents of interdisciplinarity. The successful curricula projects of the Progressive Education Association reveal challenging information for proponents of unified curricula in the modern school. In fact, all current interdisciplinary activities parallel efforts from the past.

Secondly, he has considered, as an essential prerequisite to the definition of interdisciplinarity, the factors that either facilitate or hinder comprehensive analysis of terms. An examination of both the theory and practice of interdisciplinarity has provided a philosophical depth that has enabled the writer to think about the concept and present definitions to guide the study of interdisciplinarity.

Third, he has focused attention on the all-encompassing nature of interdisciplinarity. A typology of related terms is necessary to explain the concept. Interdisciplinarity is more than just an attitude, more than just a theory, and more than just a practice to unify curricula. A continuum of educational experiences can be classified according to criteria selected to reveal the intensity and scope of the relationships in curricular unification efforts. The distinctive terms presented are necessary for educators interested in identifying the tremendous variety of interdisciplinary activities.

Finally, the writer has examined the development of secondary education in Newfoundland to highlight possibilities for an interdisciplinary approach. The revised program has the flexibility, in theory and in practice, to include interdisciplinarity as a viable alternative in both content organization and teaching practices. Skills, themes and problems are organizing principles that guide both the selection of content from

all school subjects and classroom activities that unify the curriculum. In the writer's opinion, significant possibilities exist in Newfoundland's secondary schools for the development and implementation of an interdisciplinary approach to education.

Implementation Strategies

Some suggestions for implementation may focus educational attention on the feasibility of utilizing this potential for interdisciplinary approaches in Newfoundland's secondary schools. Furthermore, an awareness of teacher attitudes and organizational factors that discourage innovation is important for translating interdisciplinarity into classroom activities.

Interdisciplinarity entails a change in teaching methodologies to accompany a reorganization of knowledge. As Cohen (1978, p. 124) claimed,

interdisciplinary education is an attitude as well as a set of methods for posing problems that transcend subject matter boundaries.

Fundamental assumptions about pedagogy are involved, because only after they challenge traditional attitudes and methods will teachers be able to accept interdisciplinarity as a viable alternative in Newfoundland's secondary schools.

True interdisciplinarity is no haphazard affair, calling for appropriate resources, administrative support and careful planning. However, biases founded on

traditional approaches to the curriculum effectively resist changes required for interdisciplinarity. To be successful, advocates of interdisciplinary activities will have to cope with attitudes, organizational structures and administrative practices that resist this innovation.

One barrier to interdisciplinarity is teacher attitude towards innovation and change. In fact, teacher apathy in education has effectively destroyed the adventurous spirit and enthusiasm of many innovators. Although teachers view innovation cautiously, their acceptance and support are the keys to the success of any educational endeavor (Khan and Traub, 1980; Brown and McIntyre, 1982). Negative teacher attitudes in Newfoundland may need to be greatly reduced to facilitate the cooperation necessary if interdisciplinarity is to come to pass.

Teacher attitudes are exemplified by a specialist syndrome that characterizes high school education. Some opponents of interdisciplinarity worry that education may indeed provide for synthesis at the expense of intellectual responsibility (Doebler, 1980). Others argue that the character of the disciplines will be confused and their integrity threatened because their contributions to education will be somewhat diminished in an interdisciplinary relationship. Still others are certain that existing faculty cultures with their distinctive socialization patterns for members, their loyalties to

their subjects, and their specialized languages will prevent any effective interdisciplinary communication (Gaff and Wilson, 1971).

Other opponents voice concerns about the problems involved in determining what is basic to the contributing disciplines in order to select the concepts to include in an interdisciplinary curriculum. Finally, many are vocal in their belief that interdisciplinary studies are impractical, because (1) teachers are trained in a particular discipline and have no professional interest in other disciplines, (2) teachers have enough trouble just keeping up to date in professional development in one discipline, (3) the inordinate amount of long range planning and co-ordination demanded is not feasible.

A second obstacle to interdisciplinarity is an organizational malaise that maintains traditional subject delineations in the secondary school. The fixed schedule helps to perpetuate standardization. Space utilization complements inflexible scheduling in reflecting the instructional priorities of the school. Staff selection and deployment policies relate to the subject curriculum.

In addition, limited learning resources restrict much classroom learning to textbooks. Authorities prescribe textbooks, curriculum guides, and resource materials that reinforce an intellectual closure endemic to the subject design. Milburn (1977) explained that textbooks present a non-controversial and conventional view of social concerns

to achieve the consensus that is necessary for publication. Textbooks narrow teachers' visions of the curriculum. A dependence on textbooks and teacher inability to transcend them is a key obstacle to interdisciplinary studies. As English (1967, p. 233) stated, the text is a procrustean bed of learning because, "like Procustes, we have either stretched our students' legs or cut them off to fit the textbook".

The underlying theme in these aspects of education is the lack of flexibility, and the resulting inability to respond speedily to new educational demands. Concepts of time, space and resources become major determinants for the styles of teaching and learning we employ, effectively preventing subsequent innovations.

Administrative strategies that are often considered essential to implement interdisciplinary studies include flexible scheduling, variable grouping procedures, more open structural design for schools, and the provision of more appropriate learning resources. However, interdisciplinary activity in some form is reasonably sure of success in most schools, in spite of the absence of these variables.

Not all interdisciplinary activities are structured so systematically as those that require intensive implementation strategies. Some are unstructured, depending upon whatever a particular group of students and their teacher decide is worth studying. In fact, many

interdisciplinary projects grow naturally out of the impromptu cooperation among teachers who choose to work together. As Humphreys (1975) noted, a decision on the level of interdisciplinary activity is critical to implementation. A teacher who wants simply to work with another teacher is working at a different level than is the research oriented person or the member of a complex, structured teaching team.

Preliminary decisions on which curriculum design to adopt determine the educational pervasiveness of interdisciplinarity. Conrad and Wyer (1980) suggested that educators must decide on the extent that interdisciplinarity is to pervade a program, especially how it relates to other parts of the curriculum. A component approach offers interdisciplinarity concurrently with the regular curriculum. Or the entire curriculum could be reorganized around a topic.

Obviously, short term units of instruction can be easily incorporated into programs with the least amount of disruption. They are both attractive and self-contained. According to the Director of Instruction at the Newfoundland Department of Education, units of illustrative interdisciplinary activities would be preferred because they would complement rather than alter the existing high school structures (Interview, November 21, 1985).

Beane (1976) and Glatthorn (1980) argued that resource units are very practical for implementing interdisciplinarity. Units identify learning objectives, content, resources, activities and evaluation devices. Lessons demonstrate how content can be organized to illustrate interdisciplinary connections among the subjects involved in the unit.

These units could be team-planned but not necessarily team-taught. Squires et al. (1975, p. 36) decided that an interdisciplinary course

may or may not require that teachers actually teach together in the same room; but it must certainly depend on prior joint planning and on general awareness of what everyone is doing.

Glatthorn (1980) noted a similar distinction. While an interdisciplinary course is usually taught by a team of teachers, "a carefully developed interdisciplinary course could be taught by one well prepared teacher" (p. 85).

Unfortunately, the professional interests of teachers and the staff commitment that is so crucial to successful implementation are both thwarted by this approach to interdisciplinarity. As Foshay (1980, p. 92) stated, learning packages are bounded, self-perpetuating entities that functioned efficiently "where no original thinking was required - indeed no thinking at all". Units depend on prescribed instructional approaches. Various manuals may contain teaching strategies that run counter to the diversity of teaching styles present in the classroom.

For example, Sigurdson (1981) concluded that units of interdisciplinary activities developed for teachers in Alberta did not get widespread use. There was no evidence that teachers actually changed their instructional strategies to those expected in the curriculum materials.

Interdisciplinarity is not so much an issue of content as one of method (Beck, 1980) and one of context (Dallas, 1982). Instructional efforts are made to overcome the isolation of single subjects. In other words, the emphasis shifts to the primary importance of the teacher and his ability to reveal relationships among subjects in his classroom teaching strategies. Anthony (1974) distinguished between the curriculum as a course of study and the implementation of that curriculum. Although the two are intended to be mutually supportive in philosophy and practice, this is often more an ideal than a reality.

Basically, team teaching is recognized as a means to overcome many of these obstacles. The philosophy of team teaching is to capitalize on the individual teacher's strengths, to build professional relationships, and to give up the traditional notion of "rights" to particular students or classrooms. Accordingly, team teaching and the interdisciplinary philosophy are closely related. For example, the units described by Sigurdson (1981) presumed extensive rearrangements of teaching responsibilities and

school operation. Block scheduling and team teaching were considered essentials for implementation.

A broadly informed teacher may attempt successfully to cover the material formerly presented by several subject teachers, but any interdisciplinary proposal ought to benefit from a cooperative effort from these teachers working together with a group of students. However, team teaching can also be fraught with difficulty. It puts together teachers of varying abilities, different philosophies, different perceptions of knowledge, and different teaching styles, any one of which can effectively disrupt the potential benefits of team teaching.

Regardless of the pervasiveness of interdisciplinary activity in Newfoundland's secondary schools, whether unit approach or team teaching approach, valuable suggestions do exist for planning interdisciplinarity. The National Association for Core Curriculum proposed these as a springboard for interdisciplinary activities:

1. Decide which subjects will be combined or replaced.
2. Review goals and objectives for that grade level and/or subjects.
3. Review curriculum scope and sequence. Determine the degree of flexibility.
4. Determine the type of interdisciplinary unit you will attempt: correlated, fused, or core.

5. Brainstorm themes, topics, or problem areas that: (1) fit the given curriculum, (2) are interdisciplinary, and (3) appear to be relevant to students.
6. Seek student reactions and input.
7. Select one or two themes, topics, or problem areas for further development.
8. Explore the contributions of each subject area to the unit, including pertinent content, skills, and learning activities.
9. Develop an overall framework or outline for the unit.
10. Locate learning materials and other sources. Invite students to help.
11. Plan procedures for evaluating student learnings.
12. Determine logistics:
 - a. Time frame; full-time or part time.
 - b. Student groupings.
 - c. Rooms and other facilities needed.
 - d. Equipment needed.
13. Carry out the unit, seeking student input along the way and at its conclusion.
14. Evaluate the unit.

(Adapted from A NACC Brochure, undated)

In conclusion, interdisciplinarity can free the educational system from the usual restraints associated with the curriculum and recognize teachers as professionals capable of designing interdisciplinary approaches that avoid the intellectual closure of textbooks and units of study.

Educators are challenged to develop a spirit of adventure in teaching (Doebler, 1980). This would help

them to open new perspectives and possibilities to "free up the mind", thereby questioning traditional practices (Humphreys, 1975, p. 4). Seeberg (1980, p. 35) suggested that interdisciplinarity requires educators to "think Martian", to develop a perspective that

forces us to look at things new, reminding us that our thought categories are not rigid and fixed but arbitrary and changeable; that we are free to manipulate our storehouse of knowledge any way we choose.

This interdisciplinary ideal can be promoted in secondary schools across Newfoundland.

Recommendations

The writer recommends:

1. that the Department of Education issue a policy statement to clarify interdisciplinarity to educators and to suggest methodology to teachers interested in implementing interdisciplinary approaches to education in Newfoundland;
2. that the Department of Education prepare a teacher handbook to promote approaches to interdisciplinary activities in secondary schools: a skills approach, a thematic approach and a problems approach;
3. that the Department of Education, in conjunction with the Newfoundland Teachers Association and district school boards, develop and implement pilot interdisciplinary projects in selected Newfoundland schools;

4. that the Department of Education, in conjunction with the Newfoundland Teachers Association and district school boards, promote regular inservice to
 - (a) increase teacher awareness of the interdisciplinary possibilities in the secondary program;
 - (b) reiterate the need for an interdisciplinary approach to achieve the Aims of Education; and
 - (c) provide opportunities for teachers to devise interdisciplinary materials and teaching strategies for classroom use;
5. that the Department of Education, in conjunction with the Newfoundland Teachers Association, the district school boards, and public and private agencies, collate and distribute print and non-print materials to support interdisciplinary activities in secondary schools;
6. that the Department of Education initiate and coordinate a study of courses in the secondary program by subject specialists from the Department, the Newfoundland Teachers Association and district school boards, with intent to
 - (a) identify concepts and skills that may be common to the subjects;
 - (b) develop resources and strategies to relate these concepts and skills to selected themes and problems;
 - and (c) promote an interdisciplinary approach to these concepts and skills in formal and informal contact with teachers;

7. that the Newfoundland Teachers Association heighten teacher awareness of the role of interdisciplinarity in Newfoundland's classrooms;
8. that the special interests councils and subject councils of the Newfoundland Teachers Association act as effective change agents to (a) influence teachers to adopt interdisciplinary approaches; (b) establish rapport with curriculum committees from the Department, thereby promoting interdisciplinarity among administrators and policy makers; and (c) encourage professional interest in interdisciplinarity;
9. that Memorial University's Faculty of Education cooperate with the Faculty of Arts and the Faculty of Science in offering summer institutes, short courses, and other inservice designed to introduce teachers to interdisciplinary studies and strategies;
10. that Memorial University's Faculty of Education incorporate a number of credits from minor interdisciplinary programs in the Faculty of Arts and the Faculty of Science (i.e., Canadian studies, Newfoundland studies, women's studies, environmental studies) into its degree structure;
11. that Memorial University's Institute for Educational Research and Development, upon appropriate requests from the Department of Education, the Newfoundland Teachers Association, and district school boards,

provide its support and expertise to implement and assess interdisciplinary approaches in secondary schools;

12. that the Department of Education, the Newfoundland Teachers Association, and district school boards utilize the potential for research and development in interdisciplinarity that exists at Memorial University;
13. that district superintendents, assistant superintendents and school principals promote interdisciplinarity through their professional groups: The Newfoundland Teachers Association School Administrators' Council and the Newfoundland and Labrador Association of School Superintendents;
14. that the following agencies pool resources and communicate ideas for interdisciplinary education:
 - (a) Centre for Newfoundland Studies
 - (b) Faculty of Education Clearinghouse
 - (c) Newfoundland Teachers Association Information Centre
 - (d) Department of Education Instructional Materials Centre
 - (e) District resource centres;
15. that the following educational agencies in a position to effect change in the educational system work towards a congruence of aims and objectives for the future development of interdisciplinarity:

- (a) Newfoundland Teachers Association
 - (b) Department of Education
 - (c) Memorial University's Faculty of Education
 - (d) Newfoundland and Labrador School Trustee's Association
 - (e) Denominational Education Councils
 - (f) Newfoundland Association of School Superintendents
 - (g) Newfoundland and Labrador Federation of Home and School Parent-Teacher Associations
 - (h) District school boards;
16. that the agencies listed in (15) establish a coordinating committee to plan and implement symposia specifically designed for leaders and policy makers involved in education in Newfoundland;
17. that the National Association for Core Curriculum be utilized as a source for research and development in interdisciplinarity through
- (a) "The Core Teacher" and other publications such as curriculum guides and audio-visual materials; and
 - (b) participation in NACC annual conferences to share ideas and discuss problems in interdisciplinarity with teachers, administrators, curriculum specialists and professionals;

18. that Newfoundland's educators interested in interdisciplinarity consult the following bibliographies:

- (a) Sandra C. Danforth, "Interdisciplinarity" (1981)
Available from

Vance Bibliographies
P.O. Box 229
Monticello, Illinois
61856

- (b) Gordon Vars, "Selected References on Block Time, Core, and Interdisciplinary Programs". (1983)
Available from

National Association for Core Curriculum
316 White Hall
Kent State University
Ohio 44242

- (c) Gordon Vars, "A Bibliography of Research on the Effectiveness of Block Time, Core, and Team Teaching", (1981)
Available from NACC;

19. that further study should be conducted on

- (a) the extent of impromptu, unplanned interdisciplinary activities in Newfoundland's secondary schools;
- (b) the extent of planned, structured interdisciplinary activities in Newfoundland's secondary schools;
- (c) teacher's perceptions of the feasibility of interdisciplinarity;

- (d) implementation strategies to overcome administrative or organizational barriers to interdisciplinarity in Newfoundland's secondary schools.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Adams, H. The Education of Henry Adams. Boston: Houghton-Mifflin, 1918.
- Anthony, R.B. Rationale for an Interdisciplinary Approach in the Social Studies. The Social Studies. April, 1974, 64 (4), pp. 150-151.
- Apostel, L. Conceptual Tools for Interdisciplinarity: An Operational Approach in Apostel, L., Berger, G., Briggs, A. and Michaud, G. (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972, pp. 141-181.
- Apostel, L., Berger, G., Briggs, A., and Michaud, G., (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972.
- Arnstine, D. The Deterioration of Secondary Education: Media Images, Administrative Nostrums and College Pressures. Teachers College Record. Fall, 1983, 85 (1), pp. 9-26.
- Baer, M. English and History Interdisciplinary Teaching. The Clearing House. October, 1976, 50 (2), pp. 93-94.
- Bailey, S.D. English in the Integrated Curriculum - An Interdisciplinary Approach to Canadian Studies. The English Quarterly. Winter, 1975-1976, 8 (4), pp. 1-9.
- Batts, D. Interdisciplinary Studies in Thorsten, H. and Postlethwaite, T.N. (eds.). The International Encyclopedia of Education. Volume 5, Toronto: Pergamon Press, 1985, pp. 2633-2634.
- Beane, J.A. Curriculum Trends and Practices in High Schools. Educational Leadership. November 1975, 33 (2), pp. 129-133.
- _____. Options for Interdisciplinary Teams. Dissemination Services in the Middle Grades. February 1976, 7 (5), pp. 1-4.
- _____. The General Education We Need. Educational Leadership. January 1980, 37 (4), pp. 307-308.

- Blum, A. Integrated Science: Educational Programs in Thorsten, H., and Postlethwaite, T.N. (eds.). The International Encyclopedia of Education. Volume 5. Toronto: Pergamon Press, 1985, pp. 2600-2605.
- Bochner, S. Eclosion and Synthesis: Perspectives on the History of Knowledge. New York: W.A. Benjamin, 1969.
- Boisot, M. Discipline and Interdisciplinarity in Apostel, L., Berger, G., Briggs, A., and Michaud, G., (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972, pp. 89-97.
- Bornstein, R. An Interdisciplinary Approach to War-Peace Studies. English Journal. February, 1974, 63 (2), pp. 64-68.
- Bossing, M.L. What Is Core? School Review. April, 1955, 63 (4), pp. 206-213.
- _____. Why Core? The High School Journal. October, 1964, 48 (1), pp. 25-34.
- Boulding, K.E. The Future of General Systems in A.M. White (ed.). Interdisciplinary Teaching. San Francisco: Jossey-Bass, Incorporated Publishers, 1981, pp. 27-34.
- Boyer, E.L. Seeing the Connectedness of Things. Educational Leadership. May, 1982, 39 (8), pp. 582-584.
- _____. High School: A Report on Secondary Education in America. New York: Harper, 1983.
- Boyer, E.L. and Levine, A. A Quest for Common Learning: The Aims of General Education. Washington, D.C.: The Carnegie Foundation for the Advancement of Teaching, 1981.
- Broido, J. Interdisciplinarity: Reflections on Methodology in Kocklemans, J.J. Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania University Press, 1979, pp. 244-305.
- Broudy, H.S. Science and Human Values. The Science Teacher. March, 1969, 36 (3), pp. 23-28.
- _____. The Real World of Public Schools. New York: Harcourt, Brace, Jovanovich Incorporated, 1972.

- Beauchamp, G.A. Curriculum Design in Fenwick, W.E. (ed.). Fundamental Curriculum Decisions. Alexandria, Virginia: ASCD, 1983, pp. 90-98.
- Beck, J.P. Theory and Practice of Interdisciplinary English. English Journal. February, 1980, 69 (2), pp. 28-32.
- Bellows, Brother G.R. Professionalism for Professionals: A Report on a Team Teaching Project at Brother Rice High School. The NTA Journal. April, 1967, 58 (4), pp. 29-30.
- Bennett, S.G. Reading and Writing at a Snail's Pace. English Journal. February, 1980, 69 (2), pp. 42-43.
- Bent, R. and Unruh, A. Secondary Education Curriculum. Lexington, Mass.: D.C. Heath and Company, 1969.
- Berard, R.N. Integrating Literature and History: Cultural History in Universities and Secondary Schools. The History Teacher. August, 1983, 16 (4), pp. 505-517.
- Berger, G. Interdisciplinarity. Papers presented at the Society for Research into Higher Education European Symposium on the Interdisciplinary Courses in European Education. September 13, 1975. Surrey: SRHE at the University of Surrey, 1977. (ERIC Document Reproduction Service No. ED 165 512)
- Berman, L.M. New Priorities in the Curriculum. Columbus, Ohio: Charles E. Merrill Publishing Company, 1968.
- Bigge, M.L. and Hunt, M.P. Psychological Foundations of Education. Third Edition. New York: Harper and Rowe Publishers, 1980.
- Birkmaier, E.M. The Core Curriculum: A Promising Pattern for the Education of Adolescents. School Review. September, 1955, 63 (6), pp. 330-333.
- Blenkin, G.M. and Kelly, A.V. The Primary Education. New York: Harper and Rowe Publishers, 1981.
- Blishen, E. (ed.). Encyclopedia of Education. New York: Philosophical Library Incorporated, 1970.
- Black, M. Models and Metaphors. Ithaca, New York: Cornell University Press, 1962.

- _____. Educational Unity in a Pluralistic Society. School Review. November, 1977, 86 (1), pp. 70-81.
- _____. What Knowledge is of Most Worth? Educational Leadership. May, 1982, 39 (8), pp. 574-588.
- Brown, S. and McIntyre, D. Influences Upon Teachers' Attitudes to Different Types of Innovations: A Study of Scottish Integrated Science. Curriculum Inquiry, 1982, 12 (1), pp. 35-51.
- Bronowski, J. Science and Human Values. New York: Harper and Rowe, 1972.
- _____. A Sense of the Future. Cambridge, Mass.: The MIT Press, 1977.
- _____. The Common Sense of Science. Cambridge, Mass.: Cambridge University Press, 1978.
- Bruffee, K.A. The Structure of Knowledge and the Future of Liberal Education. Liberal Education. Fall 1981, 67 (3), pp. 177-186.
- Bruner, J. The Process of Education. Cambridge, Mass.: Harvard University Press, 1960.
- _____. The Process of Education Revisited. Phi Delta Kappan. September, 1971, 53 (1), pp. 18-21.
- Buffett, F. Public Exams in Newfoundland. The NTA Journal, December, 1967, 59 (2), pp. 8-13.
- Burchell, H.R. On Interdisciplinary Education. The High School Journal. November, 1971, 55 (2), pp. 78-85.
- Butts, R.F. The Public School: Assaults on a Great Idea. The Nation. April 30, 1973, pp. 16-24.
- Calabrese, M. Lend Me A Hand: A Demonstration Lesson for a Biology/English Cluster. July, 1982, 11 p. (ERIC Document Reproduction Service No. ED 220 858)
- Callahan, J.F. Curriculum Based Trends in Callahan, J.F. and Clarke, L.H. (eds.). Planning for Competence: Innovations and Issues in Education. New York: MacMillan Publishing Company Incorporated, 1977, pp. 42-68.
- Callahan, J.F. and Clarke, L.H. (eds.). Planning for Competence: Innovations and Issues in Education. New York: MacMillan Publishing Company, Inc., 1977.

- Cameron, W.B. The Hydra-Headed Curriculum: The Proliferation of Interdisciplinary Studies. Journal of Higher Education. April, 1965, 36 (4), pp. 307-312.
- Canadian Symbols Kit. Ottawa, Ontario: Department of the Secretary of State of Canada.
- Carlisle, E.F. Teaching Scientific Writing Humanistically: From Theory to Action. The English Journal. April, 1978, 67 (4), pp. 35-39.
- Chadwick, R.P. Teaching and Learning: An Integrated Approach to Christian Education. Old Tappan, N.J.: Fleming H. Revell Co., 1982.
- Champlin, N.L. Concerning Integration in Vandenberg, D. (ed.) Theory of Knowledge and Problems in Education. Urbana, Illinois: University of Illinois Press, 1969, pp. 166-173.
- Chiara, C.R. The Core Teachers Major: Youth. School Review. 63 (8), November, 1955, pp. 422-428.
- Cluck, N.A. Reflections in the Interdisciplinary Approaches to the Humanities. Liberal Education. 66 (1), Spring 1980, pp. 67-77.
- Cohen, M. Whatever Happened to Interdisciplinary Education? Educational Leadership. November, 1978, 36 (2), pp. 122-126.
- Confrey, J. Content and Pedagogy in Secondary Schools. Journal of Teacher Education. January-February, 1982, 33 (1), pp. 13-16.
- Conkright, A.M. "Only Connect..." A Passionate Plea for an Integrated Curriculum. 1982, 20 p. (ERIC Document Reproduction Service No. ED 231 409)
- Conrad, C.F. and Wyer, J.C. Liberal Education in Transition: AAHE - ERIC/Higher Education Research Report No. 3. 1980, 78 p. (ERIC Document Reproduction Service No. ED 188 239)
- Cosh, C. Graduation Exercises Can Be Fun and Safe. The Newfoundland Herald. May 24, 1986, p. 24.
- Critchfield, M.A. Elementary Social Studies: An Interdisciplinary Approach. Toronto: Charles E. Merrill Publishing Company, 1978.

- Crocker, R. and Riggs, F. Improving the Quality of Education: Challenges and Opportunity - Final Report of Task Force on Education. St. John's, Newfoundland, April, 1979.
- Dallas, S. What Are Interdisciplinary Studies? Centre for the Study of Community Colleges Bulletin No. 2, 1982, 4 p. (ERIC Document Reproduction Service No. ED 219 116)
- Dancy, J. The Notion of Coherence in the Curriculum. Oxford Review of Education. June, 1982, 8 (1), pp. 21-26.
- Deer, R.L. A Note on Curriculum Integration. Curriculum Issues. 1981, 11 (4), pp. 389-392.
- Dewey, J. The Child and the Curriculum. Chicago: The University of Chicago Press, 1902. Reprinted in M.S. Dworkin (ed.). Dewey on Education. N.Y.: Columbia Publications, 1959, pp. 175-188.
- _____. Democracy in Education. New York: MacMillan Incorporated, 1916.
- _____. How We Think (Revised). Lexington, Mass.: D.C. Heath and Company, 1933.
- _____. The School and Society. (Revised Edition). Chicago: University of Chicago Press, 1956.
- Doebler, B.A. Skinning Cats and Interdisciplinary Studies: A Caveat. Change. November-December, 1980, 12 (8), pp. 10-12.
- Dorenkamp, A.G. Resisting Closure: Integrating the Humanities and Social Sciences. April 1982, 11 p. (ERIC Document Reproduction Service No. ED 217 492)
- Doyal, L. Interdisciplinary Studies in Higher Education. Universities Quarterly. Autumn, 1974, 28 (4), pp. 470-484.
- Dressel, P.L. The Meaning and Significance of Integration in Henry, N.B. (ed.). The Integration of Educational Experiences: The Fifty-seventh Yearbook of the National Society for the Study of Education. Chicago, Illinois: The University of Chicago Press, 1958a, pp. 1-25.

- _____. Integration: An Expanding Concept in Henry, N.B. (ed.). The Integration of Educational Experience: The Fifty-seventh Yearbook of the National Society for the Study of Education. Chicago, Illinois: The University of Chicago Press, 1958b, pp. 251-266.
- Duffy, E.J. Directions for Learning: We Have the Tools in National Association of Secondary School Principals. The 80's - Where Will the Schools Be? Reston, Va., NASSP, 1974, pp. 4-8.
- Duguet, P. Approaches to the Problem in Apostel, L., Berger, G., Briggs, A. and Michaud, G. (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972, pp. 11-74.
- Eason, D.O. Charting the Territory: Interdisciplinary Studies. A paper presented at the annual meeting of the Southeastern Conference of England. Biloxi, Mi., February 20, 1981, 9 p. (ERIC Document Reproduction Service No. ED 208 914)
- Eisner, E.W. The Future of the Secondary School. Curriculum Theory Network, 1975, 5 (2), pp. 128-138.
- _____. The Kind of Schools We Need. Interchange, 1984, 15 (2), pp. 1-12.
- Elbow, P. Real Learning and Non-disciplinary Courses. The Journal of General Education. July, 1971, 23 (2), pp. 111-140.
- English, F. The Textbook-Procrustean Bed of Learning. Phi Delta Kappan. April, 1967, 48 (8), pp. 393-395. Reprinted in J.M. Palaroy (ed.). Elementary School Curriculum: An Anthology of Trends and Challenges. N.Y.: The MacMillan Co., 1971, pp. 233-237.
- Environmental Education: A Catalogue of Resources for Grades 1 to 12. Alberta: Curriculum Branch, Alberta Department of Education, 1983.
- Estep, M.L. A Systems Interpretation of Multidisciplinary and Interdisciplinary Inquiry in Curriculum Design, 1977, 23 p. (ERIC Document Reproduction Service No. ED 134 561)
- Fagan, E. Interdisciplinary Bonding. English Journal. October, 1976, 65 (7), pp. 31-34.

Fethe, C.B. A Philosophical Model for Interdisciplinary Programs. Liberal Education. December, 1973, 59 (4), pp. 490-497.

_____. Curriculum Theory: A Proposal for Unity. Educational Theory. Spring 1977, 27 (2), pp. 96-102.

Fletcher, D. Interdisciplinary Perspectives in Teaching Secondary School English: An ERIC/RCS Report. English Journal. February 1980, 69 (2), pp. 81-84.

Foshay, A.W. How Fare the Disciplines in Vantil, Wm. (ed.). Curriculum: Quest for Relevance. Boston: Houghton-Mifflin Company, 1971, pp. 134-141. Reprinted from Phi Delta Kappan, 51 (7), March, 1970, pp. 349-352.

Foshay, A.W. Curriculum Talk in A.W. Foshay (Ed.). Considered Action for Curriculum Improvement. Alexandria, B=Virginia: ASCD Yearbook Committee, 1980, pp. 82-94.

Freisinger, R. Cross-Disciplinary Writing Programs: Beginnings in Fulwiler, T. and Young, A. (eds.). Language Connections: Writing and Reading Across the Curriculum. Urbana, Illinois: NCTE, 1982, pp. 3-13.

Fulwiler, T. The Personal Connection: Journal Writing Across the Curriculum in Fulwiler, T. and Young, A. (eds.). Language Connections: Writing and Reading Across the Curriculum. Urbana, Illinois: NCTE, 1982, pp. 15-31.

Fuller, R.B. An Operating Manual for Spaceship Earth in Ewald, Wm. R., Jr. (ed.). Environment and Policy: The Next Fifty Years. Bloomington, Indiana: Indiana University Press, 1968, pp. 355-364.

Gaff, J.G. General Education Today. San Francisco: Jossey and Bass Publishers, 1983.

Gaff, J. and Wilson, R.C. Faculty Cultures and Interdisciplinary Studies. Journal of Higher Education. March, 1971, 42 (3), pp. 186-201.

Garkovick, L. A Proposal for Building Interdisciplinary Bridges. Teaching Sociology. January, 1982, 9 (2), pp. 151-168.

Getting Along: Fish, Whales and Fishermen. St. John's, Newfoundland: Breakwater Books Limited, 1984.

Gibbons, J.A. Curriculum Integration. Curriculum Issues, 1979, 9 (4), pp. 321-332.

- Gibbons, M. (Chairman). The New Secondary Education: Task Force Report. Bloomington, Indiana: Phi Delta Kappa Incorporated, 1976.
- Glatthorn, A.H. An English Curriculum for the Eighties. Urbana, Illinois: NCTE, 1980, 151 p. (ERIC Document Reproduction Service No. ED 193 671)
- Glenn, A.D. and Gennaro, E.D. An Interdisciplinary Approach for Exploring Values and Value Questions for Social Studies and Science Teachers. The High School Journal. February, 1975, 58 (5), pp. 208-223.
- Golding, F. and Poad, D. General Studies in the Open Classroom. Sydney, Australia: Angus and Robertson, Publishers, 1973.
- Gozzer, G. Interdisciplinarity: A Concept Still Unclear. Prospects, 1982, 12 (3), pp. 281-293.
- Greene, M. Curriculum and Consciousness. Teachers' College Record. December, 1971, 73 (2), pp. 254-269.
- . Toward Wide-Awakeness: An Argument for the Arts and Humanities in Education. Teachers College Record. September, 1977, 79 (1), pp. 119-124.
- . Landscapes of Meaning. New York: Columbia University Press, 1978.
- Haas, J.D. For Lack of a Loom: Problems in Integrating Knowledge. School Science and Math. January, 1975, 71 (659), pp. 4-14.
- Halliburton, D. Curriculum Design in Quehl, G.H. Developing the College Curriculum: A Handbook for Faculty and Administrators. Second Edition. Washington, D.C.: Council for the Advance of Small Colleges, 1981, pp. 460-472.
- Hamilton, D. The Integration of Knowledge: Practice and Problems. Journal of Curriculum Studies. November, 1973, 5 (2), pp. 146-155.
- . Interdisciplinary Writing. College English. March, 1980, 41 (7), pp. 780-796.
- Handbook for Senior High Schools of Newfoundland and Labrador. St. John's, Nfld.: Division of Instruction, Department of Education, October 1, 1980.

- Hamsch, T. and Vollman, W. Interdisciplinarity in Higher Education. Bucharest, Romania: European Centre for Higher Education, 1983.
- Hannum, W.H. Recent Developments in Learning Theory: The Implications for Curriculum and Instruction. The High School Journal. December, 1982 - January, 1983, 66 (2), pp. 117-122.
- Hart, F. Some Comments on the Warren Report. The NTA Journal. February, 1968, 59 (3), pp. 13-16.
- Hartman-Haas, H.J. Holistic Education: Beyond the Traditional Basic Skills. Newark, New Jersey: Division of Research Evaluation and Testing, Newark Board of Education, New Jersey, 1982, 8 p. (ERIC Document Reproduction Service, No. ED 214 419)
- Hatch, R.W. and Stull, D. A Unit Fusion Course in the Social Studies for the Junior High School. Historical Outlook, 1926, 17, pp. 371-374.
- Hausman, C.R. Introduction: Disciplinarity of Interdisciplinarity? in Kockelmans, J.J. (ed.). Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979, pp. 1-10.
- Hawes, G. and Hawes, L.S. The Concise Dictionary of Education. New York: Van Nostrand Reinhold Company, 1982.
- Heckhausen, H. Discipline and Interdisciplinarity in Apostel, L., Berger, G., Briggs, A., and Michaud, G. (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972, pp. 83-89.
- Heming, J. The Betrayal of Youth: Secondary Education Must be Changed. London: Marian Boyers, 1980.
- Herbert, L. Integration of the Social Sciences: The Challenge. Social Science Review. Fall, 1983, 23 (1), pp. 67-70.
- Hills, G. Philosophical Thinking In and About Education: Its Nature and Its Role in Higginson, W. (ed.). An Image of the Whole: Knowledge and Curriculum In an Age of Fragmentation. Proceedings of a series of symposia sponsored by the Canadian Centre for Integrated Studies and the Faculty of Education, Queen's University, February 1978, pp. 72-89, 144 p. (ERIC Document Reproduction/Service No. ED 153 817)

- Hinden, M. Bridges: A Modern Proposal to Connect the Disciplines. Liberal Education. Spring, 1984, 70 (1), pp. 13-16.
- Hirst, P. The Logical and Psychological Aspects of Teaching in Peters, R.S. (ed.). The Concept of Education. London: Routledge and Kegan Paul, 1967, pp. 44-60.
- _____. Knowledge and the Curriculum. London: Routledge and Kegan Paul, 1974.
- Horwood, H. Our Crummy Curriculum. The NTA Journal. February, 1968, 59 (3), pp. 22-24.
- House, F. (ed.). High School Feminist Studies. Old Westary, New York: The Reminist Press, 1979.
- Huebner, D. Curriculum as a Field Study in MacMillan, C.J.B. and Nelson, T.W. (eds.). Concepts of Teaching: Philosophical Essays. Chicago: Rand McNally and Company, 1966, pp. 99-118.
- Hughes, A.S. Systems Thought and Curriculum Research. Paper prepared for the annual meeting of the Canadian Society for the Study of Education. Toronto. June, 1974, 8 p. (ERIC Document Reproduction Service No. ED 114 468)
- Humphreys, L. Interdisciplinarity: A Selected Bibliography for Users. 1975, 6 p. (ERIC Document Reproduction Service No. ED 115 536)
- Humphreys, A.H.; Post, T.R., and Ellis, A.K. Interdisciplinary Methods: A Thematic Approach. Santa Monica, California: Goodyear Publishing Company Incorporated, 1981.
- Hursh, B., Haas, P., Moore, M. An Interdisciplinary Model to Implement General Education. Journal of Higher Education. 1983, 54 (1), pp. 42-59.
- Ingram, J.B. Curriculum Integration and Lifelong Learning. Toronto: Pergamon Press, 1977.
- International Encyclopedia of Higher Education. Knowles, A.S. (Editor-in-chief). Volume 5 of 9 volumes. San Francisco: Jossey-Bass Publishers, 1977.

Jantsch, E. Towards Interdisciplinarity and Transdisciplinarity in Education and Innovation in Apostel, L., Berger, G., Briggs, A. and Michaud, G. (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972a, pp. 97-121.

_____. Inter and Transdisciplinary University: A Systems Approach to Education and Innovation. Higher Education. February, 1972b, 1 (1), pp. 11-37.

_____. Interdisciplinarity: Dreams and Reality. Prospects. 1980, 10, (3), pp. 304-312.

Johnson, P. Connecting Patterns Through Environmental Education. Educational Leadership. April, 1983, 40 (7), pp. 40-41.

Johnson, R.K. Designs for Middle School Interdisciplinarity Studies. English Journal, February, 1980, 69 (2), pp. 59-62.

Judy, S. Getting Started with Interdisciplinarity. English Journal, February, 1980, 69 (2), p. 7.

Kaufmann, W. The Future of the Humanities. New York: Readers Digest Press, 1977.

Kearley, E.R. and Dwyer, P.J. Teacher's Guidebook: Our Newfoundland and Labrador Cultural Heritage. Scarborough, Ontario: Prentice-Hall Incorporated, 1984.

Khan, S.B. and Traub, R.E. Teacher Attitudes in Open and Traditional Schools. Canadian Journal of Education. 1980, 5 (3), pp. 17-30.

Kindergarten Curriculum Guide. St. John's, Nfld.: Division of Instruction, Department of Education, January, 1985.

King, A.R., Jr. and Brownell, J.A. The Curriculum and the Disciplines of Knowledge. New York: John Wiley and Sons Incorporated, 1966.

Kirby, D. Integrated Science. The Morning Watch. March-May, 1982, 9 (304), pp. 3-8.

Kocklemans, J.J. Science and Discipline: Some Historical and Critical Reflections. In Kocklemans, J.J. (ed.). Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979a, pp. 11-48.

- _____. Why Interdisciplinarity? In Kocklemans, J.J. (ed.). Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979b, pp. 123-161.
- Kockleman's, J.J. (ed.). Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979c.
- Korner, S. The Impossibility of Transcendental Deductions. Monist. July 1967, 51 (3), pp. 76-82.
- Krathwohl, D.R. The Psychological Bases for Integration in Nelson, B.H. (ed.). The Integration of Educational Experiences Fifty-seventh Yearbook of the National Society for the Study of Education. Chicago, Illinois: University of Chicago Press, 1958, pp. 43-65.
- Langer, S.K. Philosophy in a New Key. Revised. Cambridge, Mass.: Harvard University Press, 1957.
- Language Growth: A Teaching Guide for Writing Instruction in the Elementary School. St. John's, Newfoundland: Department of Education, Division of Instruction, November 1982.
- Laskey, T.J. and Applegate, J.H. The Education of Secondary Teachers: Rhetoric or Reform? Journal of Teacher Education. January-February, 1982, 33 (1), pp. 3-6.
- Laszlo, E. Integrative Principles of Art and Science in Margenau, H. (ed.). Integrative Principles of Modern Thought. New York: Gordon and Breach, 1972, pp. 365-391.
- Linski, R. The Learning Process: Theory and Practice. Toronto: D. Van Nostrand Company, 1977.
- Lucan, T.A. Social Studies as an Integrated Subject in Mehlinger, H.D. (ed.). UN ESCO Handbook for the Teaching of Social Studies. London: Croom Helm, 1981, pp. 59-77.
- MacIntosh, H.G. and Smith, L.A. Towards a Freer Curriculum. London: University of London Press, 1974.
- Magsino, R. After Dr. Brown - What? The Morning Watch. may 1977, 4, (4), -p. 1-5.

- Mahood, W. Using Metaphors to Teach Social Studies. Social Science Record. Fall, 1984, 21 (2), pp. 12-14.
- Maley, D. The Role of Industrial Arts/Technology Education for Student Development in Mathematics, Science and other School Subjects. The Technology Teacher. November, 1984, 44 (2), pp. 3-6.
- Margenau, H. (ed.). Integrative Principles of Modern Thought. New York: Gordon and Breach, 1972.
- Marsh, J.L. An Interdisciplinary Dimension. The Journal of General Education. October, 1968, 20 (3), pp. 184-189.
- Marshall, M.S. Integrated Abandoning. The Journal of General Education. July, 1969, 21 (2), pp. 125-143.
- Matthews, K., Kearley, E.R., and Dwyer, P.J. Our Newfoundland and Labrador Cultural Heritage. Scarborough, Ontario: Prentice-Hall Incorporated, 1984.
- Maynes, F.J. and Ross, J.A. Integrating School Curricula with Social Concerns. The Alberta Journal of Educational Research. September, 1984, 30 (3), pp. 179-193.
- Mayville, W.V. Interdisciplinarity: The Mutable Paradigm AAHE - ERIC. Research Report No. 9. Washington, D.C.: The American Association for Higher Education, 1978.
- McGrath, E.J. Interdisciplinary Studies: An Integration of Knowledge and Experience. Change Report on Teaching No. 6. August, 1978, 9 p. (ERIC Document Reproduction Service No. ED 157 461).
- McPhee, S. Getting the Maritimes into Maritime Schools. Atlantic Insight. December, 1984, 6 (12), p. 35.
- Meeth, L.R. Interdisciplinary Studies: A Matter of Definition. Change Report on Teaching No. 6. August, 1978, p. 10. (ERIC Document Reproduction Service No. ED 157 461)
- Meil, A. Reassessment of the Curriculum - Why? in Huebner, D. (ed.). A Reassessment of the Curriculum. New York: Teachers College, Columbia University, 1965, pp. 9-23.

- Melzer, S. Discovering America: A Pluralistic View of the American Experience. English Journal. February, 1980, 69 (2), pp. 44-45.
- Michaud, G. General Conclusions. In Apostel, L., Berger, G., Briggs, A., Michaud, G. (eds.). Interdisciplinarity: Problems of Teaching and Research in Universities. Paris, France: CERI/OECD, 1972, pp. 281-290.
- Milburn, G. Forms of Curriculum: Theory and Practice in Stevenson, H.A. and Wilson, J.D. (eds.). Precepts, Policy and Process: Perspectives on Contemporary Canadian Education. London, Ontario: Alexander Blake Associates, 1977, pp. 198-211.
- Monroe, P. (ed). A Cyclopedia of Education, Volume 1. New York: The MacMillan Company, 1911.
- Moore, W. The Curriculum and the Child. The NTA Journal. April, 1967, 58 (4), pp. 37-39.
- Moroni, A. Interdisciplinarity and Environmental Education. Prospects. 1978, 8 (4), pp. 480-494.
- Munby, H. Educational Futurology and the Potential of an Integrative Education in Higginson, W. (ed.). An Image of the Whole: Knowledge and Curriculum in an Age of Fragmentation. Proceedings of a series of symposia sponsored by the Canadian Centre for Integrated Studies and the Faculty of Education at Queen's University. February, 1978, pp. 117-131, 144 p. (ERIC Document Reproduction Service No. ED 153 817)
- Nalasco, Sister P. Public Exams: A Critique. The N.T.A. Journal. December, 1967, 59 (2), pp. 16-18.
- National Association for Core Curriculum Incorporated. 316 White Hall, Kent State University, Ohio. 44242
- Neagley, R.L. and Evans, N.D. Handbook for Effective Curriculum Development. Englewood Cliffs, New York: Prentice-Hall Incorporated, 1967.
- Newall, T. The Canadian Experience: An Interdisciplinary Course. The History and Social Science Teacher. Winter, 1979, 14 (2), pp. 121-123.
- Newell, W.H. The Role of Interdisciplinary Studies in the Liberal Education of the 1980's. Liberal Education. 1983, 69 (3), pp. 245-255.

- Newell, W.H. and Green, W.J. Defining and Teaching Interdisciplinary Studies. Improving College and University Teaching. Winter, 1982, 30 (1), pp. 23-30.
- Newton, R.R. The High School Curriculum: Search for Unity and Coherence. High School Journal. April, 1979, 62 (7), pp. 287-292.
- Oliver, A.L. Maximizing Mini-Courses: A Practical Guide to a Curriculum Alternative. New York: Teachers College Press, 1978.
- Ornstein, A.C. Change and Innovation in Curriculum. Journal of Research and Development in Education. Winter, 1982, 15 (2), pp. 27-33.
- Parker, F.W. Talks on Pedagogies. New York: El Kellogg Company, 1894.
- Peace and Security Information Kit. Ottawa, Canada: Department of National Defence, 1986.
- Peterson, Bruce. In Search of Meaning: Readers and Expressive Language. Fulmuler, T. and Young A. Language Connections: Writing and Reading Across the Curriculum. Urbana, Illinois: NCTE, 1982, pp. 107-122.
- Phelps, L.W. Dialectics of Coherence: Toward an Integrative Theory. College English. January, 1985, 47 (1), pp. 12-29.
- Phenix, P.H. Realms of Meaning. New York: McGraw and Hill, 1964.
- _____. The Moral Imperative in Contemporary Education. Perspectives on Education. Winter, 1969. Volume 2, pp. 10-15.
- _____. Transcendence and the Curriculum. Teachers College Record. December, 1971, 73 (2), pp. 271-283.
- Piaget, J. General Problems of Interdisciplinary Research and Common Mechanisms in UNESCO. Trends of Research in the Social and Human Sciences, Part 1. Social Sciences. Paris: The UNESCO Press, 1970.
- _____. The Epistemology of Interdisciplinary Relationships in Apostel, L., Berger, G., Briggs, A., Michaud, G. (eds.). Interdisciplinarity: Problems of Research and Teaching in Universities. Paris, France: CERI/OECD, 1972a, pp. 127-139.

- _____. A Structural Foundation for Tomorrow's School. Prospects. Spring, 1972b, 11 (1), pp. 12-27.
- _____. To Understand Is To Invent: The Future of Education. New York: Grossman, 1973.
- Pilley, J.G. The Boundaries of Subjects. Researches and Studies. October, 1959, 20 (3), pp. 69-74.
- Pollock, M. (ed.). Common Denominators in Art and Science. The proceedings of a conference at the School of Epistemics, University of Edinburgh. November, 1981, Aberdeen, Scotland: Aberdeen University Press, 1983.
- Pratt, D. A Cybernetic Model for Curriculum Development. Instructional Science. 1982, 11 (1), pp. 1-12.
- Pring, R. Curriculum Integration in Hooper, R. (ed.). The Curriculum Context, Design and Development. Edinburgh: Oliver and Boyd, 1971, pp. 265-273.
- _____. Curriculum Integration: The Need for Clarification. The New Era. April, 1973a, 54 (3), pp. 59-64.
- _____. Curriculum Integration in Peters, R.E. (ed.). The Philosophy of Education. London: Oxford University Press, 1973b, pp. 123-149.
- _____. Curriculum Organization: The Open University Educational Studies. London: The Open University Press, 1976.
- Radesh, H.B. On Interdisciplinary Education in Hook, S.; Kurtz, P., and Todorovich, M. (eds.). The Philosophy of the Curriculum: The Need for General Education. Buffalo, New York: Prometheus Books, 1975, pp. 227-233.
- Raymond, Sister M. Team Teaching in Ferryland. The NTA Journal. June, 1966, 57 (5), pp. 29-30.
- Report of the Sub-committee on Curriculum Reorganization presented to the committee planning the implementation of Grade Twelve. St. John's, Newfoundland: Department of Education, August, 1979.
- Roebottom, C. (Chairman). Report of the Ministers Advisory Committee on Grade Twelve. St. John's, Nfld.: Department of Education, December, 1978.

- Romey, W.D. Transdisciplinary Problem-Centered Studies: Who Is the Integrator? School Science and Math. January, 1975, 75 (659), pp. 30-38.
- Ross, F. Evolution of an Approach: Biology Instruction. English Journal. April 1978, 67 (4), pp. 51-53.
- Ross, R. The Nature of the Transdisciplinary: An Elementary Statement in White, A.M. (ed.). Interdisciplinary Teaching: New Directions for Learning and Teaching No. 8. San Francisco: Jossey-Bass Publishers, 1981, pp. 19-25.
- Rowe, W.G. Some Problems Facing the Schools Today. The N.T.A. Journal. February, 1965, 56 (5), pp. 33-37.
- _____. The Forgotten Ones. The N.T.A. Journal. February, 1968, 59 (3), pp. 17-19.
- Roy, R. Interdisciplinary Science on Campus: The Elusive Dream in Kocklemans, J.J. (ed.). Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979, pp. 161-195.
- Ruszkiewicz, J.J. Writing "In" and "Across" the Disciplines: The Historical Background. Paper presented at the seventy-second meeting of The National Council of Teachers of English. Washington, D.C. November 19-14, 1982, 10 p. (ERIC Document Reproduction Service No. ED 224 024)
- Safe Grad, 1987. St. John's, Nfld.: Alcohol and Drug Dependency Commission of Newfoundland and Labrador.
- St. Vincent Millay, E. Collected Sonnets. New York: Harper and Brothers, 1917,.
- Salmon-Cox, L., and Holzner, B. Managing Multidisciplinarity: Building and Bridging Epistemologies in Educational Research and Development. March, 1977; 22 p. (ERIC Document Reproduction Service, No. ED 135 760)
- Savage, M. General Education at Albertus Magnus College. 1982, 6 p. (ERIC Document Reproduction Service No. ED 227 779)
- Savers, B.J. Breaking Down Barriers: A Positive Approach Toward An Interdepartmental Skills Program. Social Science Record. Fall, 1984, 21 (2), pp. 24-28.

- Sayler, J.G., Alexander, W.M. and Lewis, A.J. Curriculum Planning for Better Teaching and Learning. (Fourth Edition). Toronto: Holt, Rinehart and Winston, 1981.
- Schulmeister, R. Social Problems and Interdisciplinarity. Papers presented at The Society for Research into Higher Education European Symposium on the Interdisciplinary Courses in European Education. September 13, 1975. Surrey: SHRE at the University of Surrey, 1977, 126 p. (ERIC Document Reproduction Service No. ED 165 512)
- Schwab, J.J. The Concept of the Structure of a Discipline. The Educational Record. July 1962, 43 (2), pp. 197-205.
- _____. College Curriculum and Student Protest. Chicago: University of Chicago Press, 1969.
- _____. The Practical Three: Translation into Curriculum. School Review. August, 1973, 81 (4), pp. 501-522.
- Scott, R.L. Personal and Institutional Problems Encountered in Being Interdisciplinary in Kocklemans, J.J. Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979, pp. 306-338.
- Seeberg, M.S. All the King's Men. English Journal. February, 1980, 69 (2), pp. 33-36.
- Share the Vision. Ottawa, Canada: Office of the Commissioner of Official Languages.
- Shared Evaluation Handbook (Revised). St. John's, Nfld.: Division of Instruction (Testing), Department of Education. Government of Newfoundland and Labrador, 1980.
- Sherif, M. and Sherif, C. (eds.). Interdisciplinary Relationships in the Social Sciences. Chicago: Aldine, 1969.
- Sigurdson, S.E. The Block Plan: An Alternative Approach to the Needs of Junior High School Students. An Edmonton Public Schools Project. October, 1981, 58 p. (ERIC Document Reproduction Service No. ED 212 623)
- Sizer, T.R. High School Reform: The Need for Engineering. Phi Delta Kappan. June 1983, 64 (10), pp. 679-682.

- Skilbeck, M. Forms of Curriculum Integration. General Education. Spring, 1972, No. 18, pp. 7-13.
- Smith, J.S. Viewpoint: An Integrated Humanities Course- And A Place for Greek and Roman Civilization. The History and Social Science Teacher. Summer, 1982, 17 (4), pp. 223-226.
- Smith, B.O. Curriculum Content in English, F.W. (ed.). Fundamental Curriculum Decisions. Alexandria, Virginia: ASCD, 1973, pp. 30-39.
- Smith, B.O., Stanley, W.O. and Shores, J.H. Fundamentals of Curriculum Development. (Revised). Yorkers-on-Hudson: World Book Company, 1957.
- Squires, G. (et al.). Interdisciplinarity: A Report by the Group for Research and Innovation in Higher Education. Regents Park, London: The Nuffield Foundation, 1975.
- Stamp, R.M. History/Social Studies/Interdisciplinary Studies: Vehicles for Promoting Natural Identity. One World. Summer 1980, 17 (3), pp. 16-18.
- Styles, K. and Cavanagh, G. Language Across the Curriculum: The art of Questioning and responding. English Journal. February 1980, 69 (2), pp. 24-27.
- Switzer, T. and Voss, B. Integrating the Teaching of Science and Social Studies. School Science and Math. October, 1982, 82 (6), pp. 452-461.
- Swoboda, W. Disciplines and Interdisciplinarity: A Historical Perspective in Kocklemans, J.J. (ed.). Interdisciplinarity and Higher Education. University Park, Pa.: The Pennsylvania State University Press, 1979, pp. 49-92.
- Swora, T. and Morrison, J. Interdisciplinarity and Higher Education. The Journal of General Education. Summer 1974, 26 (2), pp. 45-52.
- Tanner, D. and Tanner, L. Curriculum Development: Theory into Practice. Second Edition. New York: MacMillan Publishing Company Incorporated, 1980.
- Taylor, A.M. Integrative Principles in Human Societies in Margenau, H. (ed.). Integrative Principles of Modern Thought. New York: Gordon and Breach, 1972, pp. 211-289.

- Taylor, H. Inside Buckmaster Fuller's Universe. Saturday Review. 53 (2), May 2, 1970, pp. 56-57.
- Teilhard De Chardin, P. Building the Earth. Wilkes-Barre, Pa.: Dimension Books, 1965.
- Thom, R. Interdisciplinarity: What It Could Be; What It Could Offer in UNESCO. New Horizons of Human Knowledge. Paris, France: The UNESCO Press, 1981, pp. 89-96.
- Tompkins, G.S. Stability and Change in the Canadian Curriculum in Wilson, J.D. (ed.). Canadian Education in the 1980's. Calgary, Alberta: Delselig Enterprises Limited, 1981, pp. 135-158.
- Tooke, M.E. Developing Creativity Through an Interdisciplinary Curriculum. The Journal of Creative Behavior. 1975, 9 (4), pp. 267-276.
- Toombs, W. Interdisciplinarity in General Education: Problems in Curriculum Design. Paper presented at a meeting, Caracas, Venezuela. May, 1980, 21 p. (ERIC Document Reproduction Service, No. ED 186 572)
- Trump, J.L., and Vars, G.F. How Should Learning Be Organized? in Vantil, W. (ed.). Issues in Secondary Education. The Seventy-fifth Yearbook of the National Society for the Study of Education, Part Two. Chicago: The University of Chicago Press, 1976, pp. 214-239.
- Tykociner, J.T. Zetetics and the Areas of Knowledge in Smith, B.O. (ed.). Education and the Structure of Knowledge. Chicago: Rand McNally and Company, 1964, pp. 121-147.
- Underhill, I. and Telford, P. An Integrated Canadian Studies Course. The History and Social Science Teacher. Winter, 1980, 12 (2), pp. 119-124.
- Unruh, G. Responsive Curriculum Development: Theory and Action. Berkeley, California: McCutchan Publishing Corporation, 1975.
- Vantil, W. What Should Be Taught and Learned Through Secondary Education in Vantil, W. (ed.). Issues in Secondary Education: The Seventy-fifth Yearbook of the NSSE, Part Two. Chicago: The University of Chicago Press, 1976, pp. 178-213.
- _____. Secondary Education: School and Community. Boston: Houghton-Mifflin, 1978.

- Vantil, W. Vars, G.F., and Lounsbury, J.H. Modern Education for the Junior High School Years. Indianapolis: The Bobbs-Merrill Company Incorporated, 1967.
- Vars, G.F. (ed.). Common Learnings: Core and Interdisciplinary Team Approaches. Scranton, P.A.: Intext, 1969.
- _____. Designs for General Education: Alternative Approaches to Curriculum Integration. Journal of Higher Education. 1982, 53 (2), pp. 216-225.
- Vrooman, P.C. (ed.). Transdisciplinary Issues in Social Welfare. Waterloo, Canada: Graduate School of Social Work, Waterloo. Lutheran University, 1972.
- Wake, R. Interdisciplinarity in the Secondary School Curriculum. Education and Culture. Autumn, 1976, No. 31, pp. 22-25.
- Walker, R. Holistic Knowledge and the Politics of Fragmentation in Higginson, W. (ed.). An Image of the Whole: Knowledge and Curriculum in an Age of Fragmentation. Proceedings of a series of symposia sponsored by the Canadian Centre for Integrated Studies and the Faculty of Education, Queen's University. February, 1978, pp. 133-144, 144 p. (ERIC Document Reproduction Service No. ED 153 817)
- Wallace, D. Finding the Common Ground. English Journal. February, 1980, 69 (2), pp. 37-41.
- Walter, H. Environmental Education: How Do Newfoundland Teachers Feel? Professional Development Journal of the Newfoundland Teachers Association. Spring 1986, 74 (2), pp. 27-28.
- Wareham, A. A Look at our Public Examinations System. The N.T.A. Journal, December, 1967, 59 (2), pp. 19-22.
- Warren, P.J. The Report of the Royal Commission on Education and Youth. St. John's, Nfld.: Department of Education. Volume 1, January 1967; Volume 2, 1968.
- _____. The Royal Commission on Education and Youth: Three Years After. The N.T.A. Journal. April 1971, 62 (2), pp. 29-33.
- _____. Quality and Equality in Secondary Education in Newfoundland. St. John's: Memorial University Faculty of Education Committee on Publications, 1973.

- Warwick, D. Curriculum Structure and Design. London: University of London Press Limited, 1975.
- Webster's Ninth New Collegiate Dictionary. Springfield, Mass.: Merriam-Webster Incorporated Publishers, 1984.
- Weeks, R.M. (Chairperson. A Correlated Curriculum: Report of the Committee on Correlation of the NCTE. New York: Appleton-Century-Crofts, Incorporated, 1936.
- Wellington, J.J. Determining a Core Curriculum: The Limitations of Transcendental Deductions. Journal of Curriculum Studies. January-March, 1983, 13 (1), pp. 17-24.
- Werner, R.J. A Disciplinary Approach to Teaching the Arts. Art Education. September, 1980, 33 (5), pp. 24-25.
- Westerfield, N. Interdisciplinarity. Journal of General Education. Fall, 1981, 33 (3), p. 246.
- What's Fair. St. John's, Nfld.: The Canadian Red Cross Society, 1985.
- White, A.M. (ed.). Interdisciplinary Teaching. San Francisco: Jossey and Bass, Incorporated Publishers, 1981.
- White, E.P. Problem Solving: Its History as a Focus in Curriculum Development. School Science and Mathematics. March, 1978, 78 (3), pp. 183-188.
- Whitehead, A.N. The Aims of Education and Other Essays. New York: The Free Press, 1929.
- Willett, R.E. and Roy, P.A. Integrating Science and the Humanities: Crossing the Cultural Divide. The Science Teacher. May, 1982, 49 (5), pp. 32-35.
- Wolfe, D. Opting for "New Think" - Interdisciplinary English in the Decades Ahead. The English Journal. October, 1984, 73 (6), pp. 28-31.
- Yu, M. Multicultural Education: Natural Partner for Social Studies. Morning Watch. Winter 1987, 14 (3-4), pp. 24-28.

Zoller, U. and Weiss, S. The Issue of Sensiture
Interdisciplinary Science Oriented Curricula in the
Social Service. European Journal of Science
Education. April-June, 1983, 5 (2), pp. 147-155.

CORRESPONDENCE

Letter to National Association for Core Curriculum
December 15, 1982; response, January 28, 1983.

Letter to National Association for Core Curriculum,
January 10, 1984; response, February 7, 1984.

Letter to Mr. Brian Stewart, science teacher, A. Garrigus
Collegiate, St. Lunaire, November 5, 1985; response,
January 4, 1986.

Letter to Dr. R. Crocker, Director, Institute for
Educational Research and Development, November 14, 1985;
response December 30, 1985.

Letter to Mr. Clarence White, mathematics teacher, A.
Garrigus Collegiate, St. Lunaire, November 16, 1985;
response, December 18, 1985.

Letter to Dr. Jim Hiller, head of Department of History
and former director of the Newfoundland Studies program at
Memorial University, November 17, 1985.

Letter to Alberta Education, November 20, 1985.

Letter to Dr. Chesley Brown, Director of Instruction,
Department of Education, November 21, 1985.

Letter to Dr. Myrle Vokey, Director of Professional
Development, Newfoundland Teachers Association, December
3, 1985.

Memo to selected district superintendents, December 4,
1985; responses December 17, 1985 and January 6, 1986.

Letter to Mr. Ron Mosher and Mr. Jerry Ryan, members of
the committee working on reorganizing the junior high
school in Newfoundland, December 4, 1985.

Letter to Mr. James Crewe co-ordinator of social studies
Pentecostal Board of Education, January 8, 1986.

Letter to Mrs. Smita Joshi, consultant in social studies,
Department of Education, January 13, 1986.

INTERVIEWS

Dr. Myrle Vokey, Director of Professional Development, NTA, December 3, 1985.

Mr. Brian Stuart, science teacher, December 28, 1985.

Mr. Clarence White, mathematics' teacher, December 28, 1985.

Dr. R. Crocker, Director, Institute for Educational Research and Development, November 14, 1985.

Dr. J. Hiller, Head of Memorial University's Department of History and former director of the Newfoundland Studies program, November 17, 1985.

Dr. Chesley Brown, Director of Instruction, Department of Education, November 21, 1985.

Mr. James Crewe, coordinator of social studies, Pentecostal Board of Education, January 12, 1986.

Mr. Smita Joshi, consultant in social studies, Department of Education, January 13, 1986.

Course Descriptions, Division of Instruction, Department
of Education, Newfoundland

Social Studies

Canadian Issues 1202, February 1982
World Problems 3204, February 1983
Consumer Studies 1203, February 1982
Canadian Law 2104, March 1983
Democracy 2106, April 1982
Cultural Heritage 1200, February 1982

Mathematics

Consumer Math 1202, April 1982
Vocational Math 2202, February 1982
Business Math 3203, January 1983
Academic Math 1203, April 1982
Advanced Math 1201, April 1982
Statistics 3104, February 1984

Science

Environmental Science 3205, February 1983
General Science 1200, March 1981
Chemistry 2202, February 1982
Physics 2204, February 1981
Computer Studies 2206, February 1982

NEWSLETTERS AND NEWSPAPERS

The NTA Bulletin

| | |
|------|-------------------|
| 29:2 | October 15, 1985 |
| 29:3 | November 15, 1985 |
| 29:4 | December 16, 1985 |
| 29:5 | January 20, 1986 |
| 29:6 | March 17, 1986 |
| 29:7 | April 15, 1986 |
| 29:9 | June 16, 1986 |
| 30:6 | February 27, 1987 |
| 30:7 | May 15, 1987 |
| 30:8 | June 8, 1987 |

The Evening Telegram

November 28, 1985
December 19, 1985
February 28, 1986
March 8, 1986
March 12, 1986
May 9, 1986
January 2, 1987
January 24, 1987
July 17, 1987

The Grand Falls Advertizer

January 26, 1986

The Northern Pen

November 5, 1985
March 14, 1986
April 15, 1986
April 22, 1986
May 13, 1986

APPENDICES

APPENDIX A



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

*Department of Curriculum and Instruction*Telex 016 4101
Tel (709) 337 5800

December 15, 1982

The National Association for
Core Curriculum, Inc.
407D White Hall
Kent State University
Kent, Ohio 44242

Dear Sirs:

Here is my membership fee to your association. I understand this fee includes a subscription to The Core Teacher and entitles me to receive regular information on your other publications.

I am presently involved in examining the concept of interdisciplinarity in relationship to secondary schools in Newfoundland. Any assistance that your association can give me in my project would be greatly appreciated.

I am interested particularly in materials that illustrate the interdisciplinary approach to education.

Sincerely,

George Chaulk

NACC
The National Association for Core Curriculum, Inc.
407D White Hall, Kent State University, Kent, Ohio 44242
Telephone: 216/672-7977

January 28, 1983

Mr. George Chaulk
c/o General Delivery
St. Lunaire, Newfoundland
AOK 2X0

Dear Mr. Chaulk:

Welcome to NACC. We will do everything we can to be of assistance to you. Did you know that we have a research scholarship fund to support studies such as the one you have undertaken? I enclose the guidelines, in case you might qualify.

I enclose all the back issues of THE CORE TEACHER that we have on hand, and have billed you at \$.25 per copy. Let me know if this is not acceptable. We can make photocopies of the other back issues at 5 cents per page, if you think that would be worth the money. Each issue runs from 4 to 6 pages, and we have been publishing since 1951, so we are talking about a sizeable sum. My guess is that some of the more general references on the enclosed bibliographies will give you what you need to know, without having to read all the back issues of THE CORE TEACHER.

I also enclose single copies of all other curriculum materials we have on hand, plus a list of our Board of Directors. These I have billed at the NACC member rate. After you have looked over these materials, let me know if you have any specific questions and I will see what suggestions I can offer.

I have taken the liberty of sending you these materials right away, rather than waiting to hear whether or not you wish to order them, in the interest of saving time. If you find they are not what you want, feel free to return them.

Anything else we can do?

Sincerely yours,

Gordon F. Vars
Executive Secretary-Treasurer

Encl.



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Idex 016 4107
Ed 0586 117 7001

January 10, 1984

Dr. G.F. Vars
Executive Secretary
N.A.C.C.
407D White Hall
Kent State University
Kent, Ohio 44242

Dear Sir:

When I wrote last year, I indicated that I was researching a M.Ed. thesis on interdisciplinary studies at Memorial University of Newfoundland, St. John's, Newfoundland.

My study was interrupted because I had to go back to my principalship in September. However, I am now prepared to resume full-time study in September of 1984.

In that regard, you indicated that N.A.C.C. has a scholarship fund that I might be interested in applying for. That is indeed the case.

My thesis title is "The Nature of Inter-disciplinarity and Its Implications for the Secondary School in Newfoundland." As the title tells, this is not a statistical study, but an exploration of inter-disciplinarity to adequately define the term in all its aspects, as well as to outline what changes would have to occur in our high schools to accommodate any efforts at interdisciplinarity. My preliminary findings indicate that some indepth study as mine on this topic is totally lacking - very few teachers or administrators have heard of the concept of interdisciplinarity, let alone devised any such courses for our schools.

My thesis supervisor, Dr. Frank Wolfe, of the Department of Curriculum and Instruction at MUN, is most supportive of my efforts to "break new ground" with my study. From what I have read in the materials published by N.A.C.C., the field is quite active in the States, with some smaller efforts in Canada. I am very interested in knowing if my study would qualify me for one of your scholarships. With adequate finances, I could spend the academic year, 1984-85, broadening my knowledge on the topic. For example, I would like to visit an high school in Canada or the USA that has interdisciplinary courses to get first-hand knowledge of such factors as staffing, time-tabling, evaluation policies, etc. I would like to spend time in a university that prepares teachers for interdisciplinary schools, because the library resources in such a university would be invaluable to my study. These, along with my studies to date, would add some credibility to my project.

My thesis supervisor, Dr. Frank Wolfe, can be contacted via the Department of Curriculum and Instruction at Memorial University, St. John's, if you need details on my degree expectations. My full address is P.O. Box 138, St. Lunaire, Nfld., A0K 2X0, and my office telephone is (709) 623-2064.

Thank you very much for your consideration in this matter.

Sincerely,

George Chaulk

NACC

The National Association for Core Curriculum, Inc.
407D White Hall, Kent State University, Kent, Ohio 44242
Telephone: 216/672-7977

February 7, 1984

Mr. George Chaulk
P.O. Box 138
St. Lunaire, Newfoundland
A0K 2X0
Canada

Dear Mr. Chaulk:

Your study does indeed sound interesting, and we would like to help you in any way possible. I enclose the guidelines we use in awarding our modest research scholarships. My guess is that the problem would be No. 2. Have you ever been a "core teacher?" maybe under some other name, such as "self-contained elementary," "humanities," "common learnings"? If you think you qualify, do write again and I will set the wheels in motion to have your request considered. The amount of the awards vary; the largest ever given was \$400.

I enclose our most recent bibliography as an aid to your study. You will find that there are numerous books on interdisciplinarity under some term or other. That specific term is most often used in discussing college level programs, but you should check out other descriptors also, such as core, common learnings, integrated studies, humanities, and interdisciplinary teaming. High school programs in this country are often called Humanities, American Studies, or World Studies. I enclose a description of the Evanston, Illinois, program called Combined Studies.

Good luck on your study. Regardless of whether or not you obtain one of our grants, we would be interested in considering your results for publication in an issue of THE CORE TEACHER.

Sincerely yours,

Gordon F. Vars
Executive Secretary-Treasurer

Encl.



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex: 076 4701
Tel: (709) 577 7601

November 5, 1985

Mr. Brian Stewart
Garrigus Collegiate
P.O. Box 160
St. Lunaire, NF
A0K 2X0

Dear Brian:

Greetings!

"In his 'repertoire' of classroom experiences, the creative teacher can find, literally, hundreds of instances where interrelationships between subjects can enrich the learning experience. For example, there are numerous instances where he might use an art form to illustrate a scientific principle... Good teachers do this often in the normal course of their teaching."

The above is a quote from one of my sources for my thesis on the nature of interdisciplinary studies.

It highlights one aspect of the topic that I am particularly interested in pursuing: the use of one school subject to enrich, illuminate, and perhaps clarify another school subject.

Actually the statement reminded me of an ingenious method you used last year to illustrate scientific concepts. I am referring to your use of art work and sculpture in your Grade 12 Biology class. I wasn't completely aware of its significance at the time, but you were really using the interdisciplinary approach to teaching, and I might add, effectively.

Would you be so kind as to respond to a few questions as thoroughly and quickly as possible?

- (a) What prompted you to use this approach?
- (b) Did any such ideas emerge from your teaching methods courses?
- (c) What biology concepts were you illustrating and why was that approach the best one to teach these concepts?
- (d) Have you used that approach consistently? Occasionally? Rarely?
- (e) Have you used that approach in any other course? Religion? French? Why or why not?
- (f) Describe the reaction you received from your students. Were they enthusiastic? Did they see the connections between art and science? Was the exercise a relevant, legitimate activity for a biology class? Did they question your reasons?
- (g) Are you aware of any other subject links that are feasible?

I realize that these questions may make you reflect considerably before answering, but I'd appreciate your contribution to my research. If I use your response, you will be appropriately cited.

Sincerely,

George Chaulk

P.S. Could you also indicate how much planning time was needed for the project, and how the planning and implementation fitted into the regular Biology schedule.

G.C.

Box 131,
St. Lunaire, Nfld.
AOK 2X0

January 4, 1986

Dear George,

I hope you had a blessed Christmas and a relaxing break. I wish you all the best in the New Year-- materially, spiritually, academically and especially, socially. (I heard of your's and Gwen's engagement through the trusty (?) grapevine. Congratulations!)

I also hope this response to your questionnaire arrives in time to be useful. I will take your questions in a slightly different order than asked.

c) Students learn little from mere exposure to curriculum material; learning begins, I find, when they interact personally with the concepts. Some concepts in science are quite concrete and understandable to most students and the teacher can draw on their past experience and observations (eg in discussing physical phenomena like the laws of gravity or motion or describing an ecosystem). Other concepts may be very abstract and difficult for students to grasp. We often use three-dimensional models in science to better visualize microscopic structures or mathematical models expressed in graphs to illustrate dynamic relationships.

One topic covered in Biology 3201 is the structure of the DNA (deoxyribonucleic acid) molecule. It is a key concept because all hereditary material, the chromosomes in the nucleus of every cell in every living organism, is made of DNA. Once Watson and Crick elucidated its structure in 1953 they were able to explain how cells use their stored 'blueprints' in living and how they could provide new 'daughter' cells with complete sets of these stored hereditary instructions. Watson and Crick constructed a large three-dimensional model of a small portion of DNA. I really only asked the students to do the same using the textbook illustrations as guides and employing whatever materials they could find around home.

b) This model-building project must have been suggested, along with others, in some methods course I've taken, but I 'reinvented the wheel' in this case.

a) My previous class in this course ('83-'84) had had difficulty remembering the detailed structure of the DNA molecule and how it worked. I wanted to make it more real to my students this time. I was also looking for a project for them to do for credit that was a little different from the routine research essay or basic study-reading of the text.

f) At first the class was a bit dubious, but they seemed to enjoy it and most were quite proud of their models. One pair of students made an eight foot long monstrosity of painted styrofoam pieces and wire. Another couple spent hours shaping, painting and connecting dozens of wooden pieces. Most made smaller models of coloured cardboard.

No one questioned the relevance of the activity since there were photographs of such models in the textbook. Some thought it required more work than was justified for one topic in a Level III course. Others told me recently that they found it very helpful in really getting an understanding of the whole DNA concept.

d) I have used models in various science courses but this was the first time I asked a class to build a DNA molecule. If time permits I expect to do it again this year. Last year I assigned each lab group in my Physical Science 2205 class to build a model of a different type of atom (eg oxygen, sodium, zinc, etc.) showing the electrons in orbitals around the nucleus. It was fairly successful and they enjoyed seeing the various models hanging around the room from the ceiling.

One year I used short pieces of coloured rope to show a senior biology class how DNA molecules replicated to form new ones. It would have been more successful if I'd had multiple sets to let them work with rather than doing it as a demonstration.

With reference to your P.S., the planning was minimal for me and not much class time was used up on the DNA models. I used part of one period to introduce and explain the project. They did the work at home and asked for advice either during later classes or (usually) outside of class. I used part of another period to mark them. In fact, I had each group assign a grade to all the others and I considered their mark in assigning my own final grade.

Younger classes require more class time for such projects so I use them less often. The Junior High science courses are already highly activity-oriented and don't really need or allow time for additional activities.

e) I had not thought of using models in my other courses. Just about anything can be done in French, it seems, under the banner of 'cultural component', but we usually use French music, map making, films and sometimes even cooking to brighten up the course.

My Level II religion course doesn't really lend itself to

model-building since it deals with apologetics and basic theology. The World Religions course doesn't give us much time for additional activities but even so, what could we build? Would a Hindu temple or a papier maché Buddha be acceptable to the Board?!

g) As far as other inter-disciplinary possibilities, I think we are limited more by the demands of a course outline and a tendency to fall into ruts that limit our imagination than anything else. Science, for example, actually overlaps nearly every other discipline there is (eg history, math, philosophy, psychology, theology, geography and, of course, language arts). Math can even help religion (theology) illustrate the triune nature of God: Christians do not serve three gods ($1+1+1=3$) as Jews think we do, but only one God in three distinct persons ($1 \times 1 \times 1 = 1$). Physics can illustrate the trinity, too: the compound designated H_2O can exist in three different states --ice, water or steam, but is chemically the same in all three.

Before I get carried away let me dispatch this to you speedily and get back to thinking up something exciting for my classes to do on Monday!

Yours sincerely,

Brian Stewart

P.S.

How do you like the typing? I used our new Canon AP300 to do this up on. It's great!



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex: 016-4101
Tel: (709) 333-7600

November 14, 1985

Dr. R. Crocker, Director
Institute for Educational Research
and Development
Faculty of Education
Memorial University
St. John's, Newfoundland

Dear Sir:

Thank you for agreeing to an interview in your capacity as Director of the Institute for Educational Research and Development. I want to explain my intentions and focus the discussion by this letter. This is a convenient way to structure the interview, since your responses to specific questions could be useful to my work.

My topic for my M.Ed. thesis (Curriculum and Instruction) is "The Nature of Interdisciplinarity and Its Implications for the Secondary School in Newfoundland." Interdisciplinarity, as simply stated as possible, is any effort to interrelate school subjects to improve the learning opportunities for students by overcoming inherent weaknesses in the present subject-dominated curriculum and its accompanying pedagogy.

Of course, the concept of interdisciplinarity involves a great variety of such efforts at linking subjects, ranging in scope from simple juxtaposition of subjects around a theme or problem to complete integration of concepts and methods.

My literature search indicates that the most prevalent type of interdisciplinary activity implies several supporting organizational and teaching strategies. Team teaching, flexible scheduling practices, and flexible use of facilities - these appear to be prerequisites. Added are such matters as local curriculum decision making (i.e., interested teachers taking the initiative for a new approach), administrative support, new evaluation

procedures catering less to "information retrieval", and the need for qualified teachers trained in an interdisciplinary perspective.

I am trying to gather some expert opinion on the implications for Newfoundland schools. My literature search does not indicate any discussion on interdisciplinary teaching in Newfoundland. It would appear that the functions of your Institute might provide some avenue for discussion and/or research in that regard.

Your brochure says that the Institute's mandate is to "conduct, support, and promote educational research" related to Newfoundland's educational system, either initiated by the Institute or some outside request. Thus it provides a practical supporting role for educational development in our province.

I would like to explore that role with the following questions related to my topic:

- (a) What specific criteria has the Institute established for worthwhile research projects?
- (b) Does the Institute respond positively to requests from individual teachers, groups of teachers, Board officials, and other interested parties, or must a request come from Department of Education/MUN officials?
- (c) What role could the Institute play in promoting new curricular arrangements or teaching approaches, i.e., the interdisciplinary approach, among Newfoundland educators? Or, does the Institute's role consist of evaluating existing practices only?
- (d) Could the Institute assume a role of initiating pre-service or in-service sessions to make teachers aware of the possibilities that now exist in the re-organized senior high program for new teaching approaches? I am referring to the "build-in" flexibility for local courses, i.e., Newfoundland Culture 1200, Environmental Science 3205, General Science 1200, Canadian Issues 1201, etc.
- (e) Similarly, could the Institute play a role in the proposed Junior High Re-organized Program? The Committee's interim reports recommend the interdisciplinary approach for several subjects: English, Math and Social Studies (February 1984 and September 1985). Some expertise will be needed to inservice teachers in teaching strategies and

evaluation procedures. What function could the Institute play?

- (f) In your opinion, might there be a connection between student dissatisfaction, alienation, and the drop-out rate in Newfoundland and the present subject organization of the curriculum, along with the teaching practices, i.e., textbooks, exams, emphasis on content coverage? Is this a viable subject to study?
- (g) Is it within the realm of possibility for the Institute to conduct a study of the obstacles to introducing interdisciplinary studies into Newfoundland's schools?
- (h) Is it within the realm of possibility for the Institute to survey practising teachers to see if they were sufficiently trained to overcome deficiencies in teaching practices? For example, teacher knowledge of adolescent psychology, learning theory and teaching methods - are teachers well-versed in these?

Although these are specific questions, they are meant to structure the interview, and your response could be a general overview of the role of the Institute. However, I would like a written response if at all possible.

Again, thank you for your time and attention, and I hope I have made clear what I am trying to accomplish by the interview.

Sincerely,

George Chauk



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Institute for Educational Research & Development

December 30, 1985

Telex: 016-4101

Tel.: (709) 737-8683/86

Mr. George Chaulk
Apt. 307
293 Freshwater Road
ST. JOHN'S, Newfoundland
A1B 1B7

Dear Mr. Chaulk,

My apologies for the delay in responding to your November 14 letter. It only surfaced during my pre-Christmas cleanup.

The following are responses to your specific questions:

- (a) Projects are conducted by the Institute as approved by the Governing Committee. We attempt to engage in a mix of basic research and research related to local policy issues. The criterion for acceptance for basic research is usually the award of a grant, under competitive conditions. This helps ensure high quality work which meets proper scholarly standards. For local policy oriented research, suggestions or requests sometimes come from local agencies, but more often work is initiated by Institute staff on the basis of their judgement as to the importance or the timeliness of a particular topic.
- (b) The Institute will attempt to respond to requests from any source. In practice, most such work is conducted in conjunction with the Department of Education or the School Boards. There is a problem of resources for local projects. Usually what gets done is what we can find funds to do.

...2

-2-

- (c) The Institute does have a mandate for curriculum development and implementation. However, we have done very little of this sort of work, mainly because of lack of resources on a local level. In practice, we do more evaluative than developmental work.
- (d) The Institute is not in the business of conducting pre-service or inservice teacher education programs. Individual members of the Institute may do such work in their capacities as members of the Faculty of Education but not under Institute sponsorship.
- (e) The above response also applies to the revised junior high school program. Institute members do not consider themselves as having any special expertise in interdisciplinary teaching.
- (f) The question of whether there is a connection between student alienation, dissatisfaction and the like and the current subject organization of the schools is, indeed, a topic which could be amenable to research. We have no immediate plans for such research, however. Perhaps, eventually, we will wish to look at the revised junior high school program, but this is not now being planned.
- (g) It is unlikely that we could conduct a study on the obstacles to interdisciplinary studies. This assumes that such an approach is desirable which, to my mind, is not clearly established. In any case, it is usually inappropriate to approach research on implementation from the perspective of overcoming obstacles. The problem is much more complex than this. For example, it is by no means clear that everybody means the same thing when they refer to interdisciplinary studies.
- (h) The Institute has done a good deal of research on teaching practices. However, we have not approached the problem from the point of view of deficiencies. We assume that teachers know more than anyone else about the day to day problems of classrooms. The best teaching is that practiced by the best teachers. Finding out how such teachers function is more interesting to us than attempting to locate areas of teacher deficiency.

-3-

I have attempted to answer your questioning directly, since a more general overview of the Institute was given during our conversation a few weeks ago. I hope these responses are satisfactory. If you feel that further discussion is needed, please let me know.

Yours sincerely,

ROBERT K. CROCKER
Director

RKC/amm



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex 016 4101
Tel (709) 737-7601

November 16, 1985

Mr. Clarence White
Garrigus Collegiate
P.O. Box 160
St. Lunaire, Newfoundland
A0K 2X0

Dear Clarence:

Greetings from academia.

"Mathematician and artist may both derive an aesthetic pleasure from the same pattern, and both will want to play with it."

This statement from one of my sources "rings a bell."

My thesis is on interdisciplinarity, including such wide ranging aspects as broadening student perspectives by using one school subject to aid teaching another school subject. For example, the use of artistic design to teach and reinforce mathematical concepts is an excellent illustration of the use of the interdisciplinary approach.

I have read about numerous creative combinations in the literature, but there is nothing quite as revealing as seeing concrete, "hands-on" examples.

Remember how fascinated I was last year by the artistic designs and patterns you and your Grade 10 math students made to illustrate mathematical concepts? I thought it was an ingenious method to teach these difficult ideas. You were using the interdisciplinary approach quite successfully.

Would you be so kind as to respond to a few questions as thoroughly as possible and as soon as possible?

- (a) What prompted you to use this approach?
- (b) Did any such ideas emerge from your teaching methods courses or college?
- (c) What Math concepts were you illustrating and why was that approach the best one to teach these concepts?
- (d) Have you used that approach consistently? Occasionally? Rarely? Or was that an isolated incident?
- (e) Are you artistically inclined? Would you consider using a similar approach, say, in science? music?
- (f) Describe the reaction the approach received from students. Were they enthusiastic? Did they see the connections you were teaching between art and math? Did they see the activity as relevant, as a legitimate activity for a math class? Did they question your reasons for the activity?
- (g) Are you aware of any other similar subject links? For example, didn't Brian use a similar approach to teach Science (Biology) concepts?

Finally, could you give me the title, author, publisher and date of publication of the book you borrowed from the Vinland School Board? No doubt it has some ideas related to my thesis topic.

I realize this has asked you to spend considerable time in responding, but I'd appreciate your contribution to my research. If I use your response, you will be appropriately cited.

Sincerely,

George Chaulk

P.S. Could you also indicate how much planning time was needed for the project, and how the planning and implementation fitted into the regular schedule, i.e., your allocated time for math?

G.C.

P.O. Box 130
St. Lunaire, Nfld.
AOK 2X0
December 18, 1985

Mr. George Chaulk
c/o Department of Curriculum
and Instruction
Memorial University
St. John's, Newfoundland
A1B 3X8

Dear George:

After giving your letter considerable thought, I am responding to the questions that you raised regarding my use of the interdisciplinary approach in my Math class.

- (a) The classroom needed some decorating. I wanted the students to see that, generally, everything in life is geometry and composed of shapes. I wanted to do something different and interesting. It helped most of the students increase their marks as they were motivated to try something new and fun. I was assigned a similar project as a student in Grade 12 and it worked well so I decided to try it.
- (b) In my Math methods course at university we were asked to construct a Math model. Several from the class made Geometric mobiles to hang from the ceiling. I constructed a great stellated dodecahedron out of straws. Presently, I have it hanging in the classroom. One of my grade 10 students (Lorna Bussey) used this as a model for her project last year.
- (c) In Chapter 1 of Geometry we are illustrating how triangles are congruent. I can easily refer to several examples in the art work. I can refer to the variety of shapes, ex. right triangle and I can also refer to the parabola illustrated in the string arts when graphing a parabola on a coordinate plane.
- (d) This was the first time that I had tried such an approach in teaching. However, I found that it was a great success and I will continue to use it at the Grade 10 level.

- (e) No. I would have to say I am not artistically inclined. A similar approach could very easily be used in Music or Science. For example: look at a picture of a street in a city lit up at night and describe how this is related to beat, pulse and meter in music. In chemistry, molecular models of atoms are very useful.
- (f) The students' reaction was generally quite positive. They were motivated by a new idea and enjoyed working on their project. Some of the students later had their picture published in the local paper displaying their models. They did realize that geometry has a lot to do with art. No one questioned the activity as not being relevant. It should be noted that the project was completed at home outside of school hours.
- (g) Almost every subject is related to art to a degree. Example: models in Science, History - the history of art, etc.

NOTE: I was unsuccessful in discovering the title, etc. of the book I had borrowed from the Vinland School Board as I had returned it to Mr. Rumbolt some time ago.

- * Pages 28, 29 and 68 in the Music textbook uses art to demonstrate some concepts.
See "Sound, Beat and Feeling", Music 1200 Text.

Clarence D. White



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex 0164401
Tel. (709) 737-7611

November 17, 1985

Dr. Jim Hiller, Head
Department of History
Faculty of Arts
Memorial University
St. John's, Newfoundland

Dear Sir:

I am currently working on a M.Ed. thesis (Curriculum and Instruction) entitled "The Nature of Interdisciplinarity and Its Implications for the Secondary School in Newfoundland." I am interested in the multidisciplinary Newfoundland studies Arts minor as a possible means of giving prospective high school teachers some insight into the interdisciplinary perspective.

A persistent theme in the literature is the need for teachers with both a broad background in training, i.e., not just one subject but a number of subjects, and an "awareness" or ability to synthesize these, to see the common ground among the subjects.

The poster promoting Newfoundland studies describes the program as a special studies area, a multidisciplinary minor option in Arts that "offers both general knowledge and significant insights into Newfoundland affairs for those intending to make a career in high school teaching..." some aspects of the program may relate to my thesis.

First, however, some definitions are necessary. Interdisciplinarity, in its broadest scope, is any effort to interrelate school subjects, with a variety of such efforts to link subjects ranging from correlating subjects, i.e., English and History, to juxtapositioning subjects around a theme, to complete integration of concepts and methods of several subjects. Multidisciplinary studies are

usually another distribution scheme to involve students in several subjects but with no effort to interrelate these. The student himself is required to provide the connections with no aid from the instructors. Interdisciplinarity, however, in its narrower sense, provides such aid to students by means of teaching methods curricular arrangements, and scheduling procedures.

Accordingly, I am interested in your responses to these questions:

- A. How is multidisciplinaryity, in the context of Newfoundland studies, defined?
- B. What rationale was used to develop the program, and why is it promoted for prospective high school teachers?
- C. Canadian studies has a senior seminar to aid students to see the "connections"; Women's studies has an introductory interdisciplinary course to focus concepts, issues, and debates. Does Newfoundland studies provide any device to help students see the relationship among courses?
- D. The university calendar describes the program as "the study of Newfoundland culture through a variety of disciplinary approaches rather than the concentration upon a single discipline." (p. 133) Does this provide the unifying thread? If so, how?
- E. Do professors act independently or is there (i) joint planning so that aspects of specific courses will reinforce each other; (ii) and concepts principles and methods of one subject are used where appropriate in other subjects?
- F. Finally, what formal or informal arrangement, if any, exists with the Faculty of Education's teacher training program to relate Newfoundland studies to the preparation of teachers?

Sincerely,

George Chauk



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex 1174-4111

Tel. (709) 734-7641

November 20, 1985

Planning and Research
Alberta Education
Devonian Building
11160 Jasper Avenue
Edmonton, Alberta
T5K 0L2

Dear Sirs:

Would you be so kind as to send me copies of the following documents published by Alberta Education in 1981?

1. Block Plan Grade 7 Instructional Manual
2. The Differentiated Support Option Handbook

Both were described in the article "The Block Plan: An Alternative Approach to the Needs of Junior High School Students" by Sol E. Sigurdson, October, 1981. (ED 212 623)

I am presently completing my M.Ed. thesis entitled "The Nature of Interdisciplinarity and Its Implications for the Secondary School in Newfoundland." Mr. Sigurdson referred to the interdisciplinary units in the manual, and one of my interests is compiling sample programs to focus on the possibilities of similar ventures in Newfoundland's schools. I note with interest, for example, that the units were devised by classroom teachers, another interest of mine.

Also, would it be possible to get answers to these questions:

1. What current status does the program have in Alberta's junior high schools?
2. Have the instructional strategies, i.e., team teaching, integration of content block scheduling, been successful?
3. What improvements or changes have been made to the program?
4. Are there other such programs in Alberta's schools? If so, could I have whatever information is available on such programs?

A response would be greatly appreciated at the earliest convenience.

Sincerely,
/

George Chaulk

P.S. I'd also be interested in Sigurdson's complete article. I have only sections from The Eric Report.



MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex 016-4111
Tel. (709) 737-7600

November 21, 1985

Dr. C. Brown
Director of Instruction
Department of Education
Confederation Building
St. John's, Newfoundland

Dear Sir:

I am presently working on a M.Ed. thesis (Curriculum and Instruction) entitled "The Nature of Interdisciplinarity and Its Implications for the Secondary School in Newfoundland".

The second interim report of the Department committee on the junior high reorganization scheme endorses and recommends the interdisciplinary approach for English (p. 41), social studies (p. 43) and mathematics (p. 45). I see this as further justification that my study is not only timely but could prove to be worthwhile to the educational scene in Newfoundland.

While the junior high program is to be, for valid reasons, different in emphasis from the senior program, and centered more on the unique needs of young adolescents than on the subject matter of the senior courses, my premise is that the interdisciplinary approach ought also to be considered for the senior grades. In any case, I define the secondary school as including Grades seven through twelve.

Accordingly, would you be so kind as to provide clarification on these aspects of the proposed intermediate program:

1. How does the Committee define the interdisciplinary approach in the context of the new program?

To explain briefly, interdisciplinary studies (and the interdisciplinary approach) could include, in broadest scope, any effort to interrelate subjects, ranging from correlation of subjects, i.e., English and History studied so as to highlight the historical context of a poem or essay, to the juxtaposition of subjects around a theme or problem, to integration of concepts and methods of several courses. What differs in most cases is the amount of instructional aid (or lack thereof) given to help the student synthesize, to see the connections among subjects: teaching methods, curricular arrangements and scheduling procedures often comprise such instructional aid. Interdisciplinary activity, I suggest, is a continuum, ranging from a situation in which the student is alone to make the meaningful connections to a situation in which the connections are made obvious by the teacher.

Are such distinctions in defining interdisciplinary activities to be dealt with prior to, or during, implementation? Or will such decisions be left to the classroom teachers?

2. Would it be possible to get further explanation of the rationale for recommending the interdisciplinary approach?

I can detect some reasons: to help students consolidate language skills (language across the curriculum); to provide for more economical use of time in the social studies classroom; to promote relevance by applying social studies/mathematics concepts to real life situations and to other subject areas; and, of course, to facilitate the teaching of specific objectives that are realized in many courses, the "instructional objectives".

3. How does the interdisciplinary approach facilitate any, or all, of these criteria for the junior high program?

Concrete exploratory activities
 Student initiated projects
 Flexibility
 Independent thinking
 Student-oriented instead of subject-oriented teaching
 Non-gradedness
 Motivation
 Instruction geared to the cognitive level of students
 Relevance
 The homeroom concept
 Modular structure.

4. Do you anticipate any problems due to teacher training as either elementary generalists or high school subject specialists?
5. Will suitable materials be available to schools, i.e., textbooks, teacher resources, supporting materials, utilizing the interdisciplinary perspective?
6. Have the implications for scheduling and facilities been considered, such as team teaching and/or team planning, provision of resource centers, provision of flexibility for variable groupings of students?
7. Finally, the intermediate program is to facilitate the passage of students from elementary to high school. Will the interdisciplinary aspects of the program translate into benefits in the high school program? If so, what and how?

Thank you for your assistance.

Sincerely,

George Chaulk

P.S. A written response would be greatly appreciated, covering the above questions in a general manner.



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

1668 10/26/85
166 10/26/85

December 3, 1985

Dr. M. Vokey
Director of Professional Development
Newfoundland Teachers' Association
3 Kenmount Road
St. John's, Newfoundland
A1B 1W1

Dear Sir:

Thank you for your permission to attend the sessions of your Special Interest Councils' Conference held November 28-30, 1985. The theme "Change and the School Curriculum" was particularly relevant to my M.Ed. thesis at Memorial.

I am researching interdisciplinary studies and the implications for Newfoundland schools. Interdisciplinary studies include all efforts to interrelate school subjects, ranging from occasional references such as a history teacher might make to literature, to a thematic approach drawing concepts as needed from subjects, to the ultimate integration of concepts and methods from two or more disciplines.

The success of interdisciplinary studies appears to depend partly on a revised curriculum, but mainly on acceptance and practice of new teaching strategies by classroom teachers. Therefore, I am interested in any groups or individuals that can act as influential change agents for implementing changes in schools. The Conference showed clearly that the Special Interest Councils could play an important role in such implementation.

Your Conference focused on "how curriculum is developed and why the ideals behind school programs are rarely transferred to the reality of the classroom." (The Evening Telegram, November 28, 1985). The Councils appear to be in a unique position to affect (and effect) what goes on in the classroom because of their members' influence

with both the Department of Education curriculum officials and classroom teachers.

There is no doubt that the Division of Instruction relies heavily on the input of teachers in curriculum matters. The expertise represented by the Councils has the recognition and respect of the Department. This was very evident in Mr. Lawrence's comments regarding teachers' involvement at one of the sessions, when he was referring to the number of teachers on subject committees, teachers helping to pilot, revise, and develop courses, and teachers participating in workshops for other teachers. And, of course, the extensive representation of Department consultants at the Conference was visible evidence in itself.

The Councils also have great potential for influencing teacher attitudes and practices. This is partly due to the capabilities of teachers on the Councils - they are the interested, motivated, the "early adopters" - and partly explained by the fact that these teachers are more readily accepted because they are not associated with the legal framework described by Mr. Derick Hounsell in his comments. In other words, I feel they are known to better reflect teacher interests without being intimidated by the system.

And, of course, as the Conference emphasized repeatedly, the teacher is central to implementation. The teacher must be willing and able to accept new materials and new teaching approaches. Changes in program must be accompanied by due consideration of appropriate pedagogy and formal (as well as informal) support systems. Time, patience and effort are needed. Dr. Dukacz stressed that failure to take such time, patience and effort with teachers has resulted in confusion at the classroom level for many innovations.

Obviously changing a teacher's classroom behavior is made more difficult if innovations call for radical (as perceived by teachers) adjustment in teaching methods. This is supported by the lack of success of some curriculum changes such as "new" math and the "discovery approach" in science, both of which were mentioned at the Conference. Interdisciplinarity will require teaching strategies that will run counter to most teachers' present methods, meaning, of course, that the success of such efforts will rely on active involvement of teachers in all phases of the program and just how well the rationale, methods and activities are explained by the proponents and understood by the teachers. Implementation thus becomes everything.

Mr. Lawrence stated that the role of the Councils in developing and implementing curricula needs to be clearly defined. He suggested that the presidents, especially, would act as catalysts to motivate involvement. NTA's policy statement (June 8, 1985) explains the general responsibilities of the Councils, as they function through the Professional Development Committee of the Association. They are to maintain a "presence" among teachers of specific subject interests or specific areas, by sponsoring workshops, helping teachers organize, preparing curriculum support papers, and encouraging regional affiliates.

With your indulgence, I'd like to speculate on the Councils' role in curriculum implementation:

1. The Councils are in an advantageous position to initiate and maintain dialogue with interested parties and thus exchange views on curriculum innovations. This gives the teacher point-of-view an effective medium of expression.
2. The Councils can communicate with teachers on pedagogical matters more effectively than any other agency, whether Department or School Board, and thus play a role in changing teacher approaches to new courses, new trends and new materials.
3. The Councils can help alleviate the stress often associated with innovation by:
 - (a) helping to translate Department or Board directives into workable tools for the classroom;
 - (b) insisting on sufficient "lead-in" time for an innovation so that teachers can have sufficient time to reflect, to plan, to discuss ramifications, to be inserviced on philosophy, rationale, methodology, materials and evaluation techniques;
 - (c) helping teachers to convert expectations to realistic goals in terms of content, scope and sequence for new courses;
 - (d) providing a social context for collaboration, for colleagues to support each other's efforts, to minimize the insulation and isolation of teachers' behavior;

- (e) helping teachers to recognize contradictions or weaknesses in their personal teaching philosophies, to identify "mind set" against innovation, and to see the need for new teaching strategy to accompany new programs;
 - (f) promoting teacher involvement in curriculum matters by encouraging participation in committees and also publicizing such involvement to ease adoption of such curriculum projects. This may address the area of sponsorship by alleviating the mistrust teachers have of proposals from "above";
 - (g) communicating concerns regarding program weaknesses not addressed by Board co-ordinators or Department consultants due to time limitations or job pressures, i.e., gifted students;
 - (h) advising Boards and teachers of appropriate change strategy, or at least reminding them that attention to such matters will, in the long run, be beneficial to their efforts;
 - (i) giving individual teachers a sympathetic ear while maintaining a positive attitude toward innovation among the majority;
 - (j) helping teachers to set their own realistic goals within the context of the proposed innovation and then gradually work toward fuller implementation in stages.
4. The Councils can help identify (a) the innovators among staffs who are not yet in the forefront in implementation, and (b) classes, schools, districts, situations, which would be suitable "starting places" for projects such as pilots, specific teaching methods, or inservice sessions.
5. The Councils can effectively participate in all levels of the teacher concerns identified at the Conference, because these concerns are personal as well as professional needs that can best be met on a personal interaction basis among teachers.

As you may realize by now, I am very interested in the theme of your Conference. My speculations have helped me become aware of the importance of the teacher in my project, and the potential the Councils have in implementing my proposals.

Your comments would be appreciated.

Sincerely,

George Chaulk

Would you be so kind as to respond to a series of specific questions? This seems to be the best way to focus our discussion, giving me results that would be useable in my thesis. I realize this is time-consuming but the very exercise of preparing these questions has helped me already by structuring my thoughts, and your answers, however speculative and opinionated, will be further "food for thought."

And, of course, the questions are speculative, based on a hypothetical situation.

Thank you for your time, patience and thought.

Sincerely,

George Chaulk

Questionnaire

An hypothetical case:

Three or more teachers in a school have been discussing the prospects of joining forces to create a team teaching situation involving, say, English, History, Geography and Science. This is in response to a demonstrated need to (a) make these courses more relevant to the lives of the students, (b) create some meaningful connections among the courses, and (c) respond to some localized theme or problem, i.e., pollution, unemployment, folklore, etc. The principal has received a written proposal for the project, along with rationale, funding needs, staffing needs, and support needs - time tabling, facilities, materials, etc. The project has his conditional approval, pending Board approval.

A. Staffing

1. Is there any flexibility in the present allocation of teachers to school boards to facilitate (or permit) such an arrangement?
2. What prior conditions would the Department and/or the Board insist upon in approving this unorthodox arrangement?
3. Would the fact that these teachers proposing the course have been trained as subject specialists jeopardize the success of the project?
4. Would the Board be prepared to hire an extra staff member to aid in the project? For example, a graduate of an interdisciplinary program, i.e., a non-conventional degree, to provide expertise?
5. How, and where, would the Board recruit such a person, since teachers are typically not trained in such a broad perspective but as subject-specialists?
6. Since such a project is going to demand either (a) released teacher time or (b) summer planning time to bring it to fruition, would the Board be able to (a) provide in-service time for planning for implementation within the present framework the Department has established for in-service of teachers; (b) released time for teachers to develop the project (along with teacher replacements); (c) funding for development of the project during a summer session; and (d) professional aid, either from the Board's curriculum development staff or from the university?

7. Since most, if not all, Board personnel are subject-specialists in their own right (i.e., Math teachers, Science teachers, History teachers - prior to becoming Board personnel) would they possess sufficient broad-mindedness, initiative, enthusiasm, rapport with the group developing the project to help implement and support the project?
8. Would the Board and/or Department provide additional funding for clerical, non-professional assistance to release these teachers from the many non-teaching activities to focus completely on the project?
9. To what extent is teacher training in the Education Faculty at Memorial University reinforcing the subject-dominated curriculum?
10. To what extent would the Department of Education be open to suggestions on alternative patterns of staffing, i.e., allocation tied to programming instead of to numbers of students?

B. Facilities

1. What determines the present standardized school building? What criteria are used to design classroom space, resource areas and common areas, such as corridors and gyms?
2. What obstacles would prevent a Board from designing and building a school structure that would cater to more flexible, student grouping arrangements?
3. Do school buildings as presently designed, specifically classrooms, reinforce and perpetuate an inherent philosophy of education: Standardization, the subject approach, the lecture method, teacher-teacher isolation, student-student isolation, learning as absorption of information, teaching as presentation, etc.?
4. To what extent does building specification and design relate to present knowledge about learning theory and student cognitive, social development?
5. Would school buildings as built according to the concept of education in item #3 above hinder or foster a more creative approach to pedagogy, i.e., the interdisciplinary approach? Would new building specifications, such as open spaces, rooms designed for

multiple groupings, areas designed to encourage student-student, and teacher-teacher interactions:

- (a) lead to more creative teaching approaches and experimentation with multiple groupings, i.e., large-group, small-group?
- (b) "entice" teachers into sharing ideas, content, methods?

C. Timetabling

1. What Board or Department restrictions prevent more variable time tabling procedures, such as:
 - (a) block scheduling of several subjects or
 - (b) modular scheduling?
2. Would Board or Department approval be necessary, for example, to joint schedule any two high school courses, along with team-teaching and a joint credit issued to students?
3. Would the present accounting, recording, and reporting system as initiated by the Department for the Reorganized Senior Program hinder such an arrangement?
4. Would the present Shared Evaluation-Public Exam set-up prohibit experimentation with interdisciplinary approaches?
5. What avenue of communication is open to the Department for teachers and principals who wish to present a case for the adjustments indicated?

D. Programming

1. Assuming that a proposed project does not fit the criteria set for courses as presently designed - Program of Studies' descriptions, course outlines, textbook and support materials such as teacher aids, the accounting and recording system - are there any avenues with the Department of Education for approval of the course as an alternative?
2. Does the senior program as envisaged by all concerned - the Department, the Board, the schools - facilitate local development of "pilot" courses, and, by present policy, encourage such courses?

3. Does the new high school program provide possibilities for interdisciplinary work that were not available under the old program? For example, does not the addition of courses such as Newfoundland Culture 1200, Canadian Literature 2200, and others in preparation (Newfoundland Literature? Newfoundland Folklore? Newfoundland History?) provide a basis for linking subjects eventually under, for example, a thematic approach on Newfoundland studies?
4. I note with great interest that MUN appears to be responding to trends in the new high school program by introducing appropriate courses or realignment of existing courses. A series of institutes have appeared for summer sessions, as well as part time credit studies in several fields, and I was intrigued by a poster meant to attract students to an interdisciplinary program of studies related to Newfoundland Studies in preparation for teachers in the classroom. Would Boards be in a position to encourage such development and influence MUN to continue to broaden its teacher program? And, since universities have a very traditional "hold" over much of what transpires in the high school program, would this movement encourage Boards to initiate projects in conjunction with the university?



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 1X9

Department of Curriculum and Instruction

Telex: 016-4101

Tel.: (709) 737-7600

August 15, 1987

NOTE:

One district superintendent responded to the writer's questionnaire on the condition that his response remain anonymous. The writer has his written permission to include the letter in his appendix.

Mr. George Chaulk

December 17, 1985

Mr. George Chaulk
Apt. 307, Bldg. 1
293 Freshwater Road
St. John's, Nfld.
A1B 1B7

Dear Mr. Chaulk:

Enclosed herewith is my response to the questions you presented in relation to your thesis topic "The Nature of Interdisciplinarity and Its Implications for the Secondary School in Newfoundland".

I trust you find the responses useful in your research. There is much more that could be said because the questions are so open ended and hypothetical. However, I have attempted to answer them as concisely and accurately as possible.

Best wishes with your work.

Enclosure

January 6, 1986

Mr. George Chaulk
Apt. 307
293 Freshwater Road
St. John's, Nfld.
A1B 1B7

Dear Mr. Chaulk:

This is to acknowledge your letter of December 20, 1985. If my letter appears anonymously I would have no difficulty with having it included in the appendix to your thesis.

A) Staffing

- 1) Our present allocation system to high schools has the following components: course periods (42 per classroom), program periods (5 per classroom), additional course periods (12 per senior high level), and principal periods (21 or 42 or 63 or 84) dependent upon enrollment category. The total of those periods divided by 42 provides the allocations not counting the library, music and guidance provisions. Within those allocations schools have almost any flexibility they desire providing there is a fair and equitable distribution of teaching load.
- 2) To approve the arrangement presented in your hypothetical case we would require a detailed proposal such as you outlined. We would also need an assurance that the total staff involved in the project was committed to and capable for the task. If additional resources in personnel, time, materials, equipment, space, etc. were required we would have to determine whether or not these could be made available without adversely affecting resources available for other parts of our program.
- 3) To use an interdisciplinary approach to teaching would require teachers who have interdisciplinary training and thus overspecialization would pose a threat to the success of the project.
- 4) The Board would consider this if it had the resources but finances are so tight at present that it is doubtful if the matter could be meaningfully considered.
- 5) To recruit personnel required the Board would identify the training desired and advertise. If no qualified applicants were available within the province, it would advertise outside.
- 6) The Board is very limited with the options available under the framework of the inservice days. However the bank days under 18.04B(b) does provide some flexibility and this could be examined as an area for consideration to provide the inservice days required. However, one would have to consider very carefully all precedents being established that may not be able to be maintained upon receiving further such requests from other schools.

It is very doubtful if the Board could find any extra funding for the special inservice that may be required.

- 7) Knowing the traditional framework within which teachers work, I would speculate that it will be very difficult to find a staff that would possess the characteristics outlined in Question 7 for this project. That is why I indicated in Question 2 my requirement that I would want to be convinced in a very compelling manner that the staff was committed to the idea.

- 8) At this time of financial restraint neither the Board or the Department has the resources available to provide any additional funding for clerical, non-professional assistance. However, if the Board could be convinced that this additional funding could produce sufficient gain to offset that, it may be willing to take certain risks.
 - 9) While MUN may be offering courses encouraging teachers to break out of traditional modes, it basically only offers to teachers a model of the traditional subject framework orientation. Each discipline area is "protecting its own turf".
 - 10) I really am in no position to speculate as to what extent the Department of Education would be open to new staffing allocation suggestions. However, I would think that they would need a method which could ensure a nondiscriminatory allocation. I am personally somewhat dubious as to whether "allocation tied to programming" can provide that.
- B)
- 1) School buildings are now designed in accordance with the Department of Education school planning manual.
 - 2) The obstacles would relate to staff and school committee acceptance of such concepts and the associated costs. School building is very expensive and one is hesitant to become involved with expensive experiments that have no assurance of stability. Will one have to provide for more traditional space in a few years if the experiment has failed?
 - 3) The creative teacher can find many ways to provide a more enhancing educational environment for children than the inherent philosophy referred to in your question. While traditional classrooms may be somewhat responsible for the inherent philosophy, the greatest deterrent to educational change is not the classroom structure.
 - 4) Attempts are made to relate building specifications and design to present knowledge about learning theory and student cognitive, social development. I believe however that creative minds should be able to produce a better relationship than presently exists. Who will lead the way? Very few clear directions appear to be emerging.
 - 5) It is my understanding that very few schools that were built according to the concept of education in Item #3 above have been much more successful than traditional schools in fostering a more creative approach to pedagogy. The answer lies more in the teacher than in the building or program.

C)

- 1) I know of no Board or Department restrictions that prevent more variable time tabling. There are regulations, however, that require an appropriate balance of time for each subject area.
- 2) Credit courses in the senior high program would certainly require Departmental approval for the issuing of joint credit. Below that the Board would need to provide the appropriate authorization. If distinct credit could be retained the question of joint scheduling may be more appropriately left to local jurisdiction. The Board, however, would need to know that credit courses included in the joint scheduling would be appropriately taught.
- 3) Yes, the accounting, recording, and reporting techniques would need to be adjusted somewhat to accommodate any issuance of joint credit.
- 4) The avenue of communication is through the school board.

D)

- 1) The Department of Education through the Director of Instruction does make provision for alternative courses to be developed.
- 2) The senior high program does not necessarily facilitate local development of "pilot" courses. Present policy does not necessarily encourage such courses but it does make provision for them to be approved if they are deemed worthy of approval.
- 3) With a greater variety of options available there are no doubt greater possibilities than before for interdisciplinary work. If such is appropriately approved, however, much care needs to be taken to ensure that a teacher's or teachers' bias does not destroy a particular course supposedly interdisciplinary.
- 4) For boards to be in a position to encourage development of MUN courses for teacher training in the interdisciplinary approach, boards would need to be convinced that this approach is superior to the traditional one.

If MUN were interested in doing some pilots in such teacher training as you indicate, boards would most likely be willing to cooperate.



MEMORIAL UNIVERSITY OF NEWFOUNDLAND

St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

*Telex: 016-4101
Tel.: (709) 737-7600*

December 4, 1985

Mr. Ronald Mosher, Principal
Bursey Memorial Collegiate
Windsor, Newfoundland

Mr. Jerry Ryan, Principal
Mount Pearl Junior High School
Mount Pearl, Newfoundland

Dear Sirs:

Dr. Brown told me that you are members of the Junior High Reorganization Committee established by the Department of Education. Your interim report recommends an interdisciplinary approach to several subjects, a teaching strategy that I am currently researching.

I enclose a copy of my letter to Dr. Brown, specifying my interests in this matter. I had a very informative interview with Dr. Brown, from which some answers emerged.

Apparently, the Committee has not really addressed the issue of interdisciplinary studies at this stage, other than general references to the appropriateness of the approach to the envisaged program.

Rather than reflect on Dr. Brown's comments, however, I am interested in your perspective on the definition, rationale and implementation of interdisciplinary studies. Would you be so kind as to respond, however generally, to the questions raised in my enclosed letter.

Sincerely,

George Chaulk



MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

Telex 018-4101
Tel. (506) 713-7440

January 8, 1986

Mr. James Crewe
Social Studies Co-ordinator
Pentecostal Board of Education
Windsor, Newfoundland
A0H 2H0

Dear Jim:

My M.Ed. Thesis is entitled "The Nature of Interdisciplinarity and Its Implications for the Secondary School in Newfoundland." Much of my reading indicates that Social Studies is a convenient, practical "lead-in" to interdisciplinary studies for Newfoundland schools because it is, by its very nature interdisciplinary in scope and approach. As both a co-ordinator of Social Studies, and an author of social studies texts, you may be able to provide some useful insights into aspects of my topic.

Interdisciplinarity, in its broadest sense, includes all efforts to unify or interrelate school subjects with the intent of improving learning opportunities for students. The goal is both to overcome alleged weaknesses in the subject-centered curriculum and to change teaching strategies in the classroom to complement new programming. For example, English and History could be correlated or co-ordinated, to highlight the historical context of literature. Or concepts, skills, and methods of one subject could be used to enrich, illuminate, and clarify another subject. Or several subjects could be juxtaposed around a theme, topic or problem to broaden students' perspectives. Or concepts could be "fused" to create a new subject, a new discipline - the true integration of concepts into a "hybrid" subject such as biochemistry.

Interdisciplinary studies usually employ organizational and pedagogical strategies such as team teaching, flexible scheduling and variable student groupings. What differs in the examples given above, for example, is the amount of instructional aid given to help students see the connections among subjects. It appears that much of the success of interdisciplinary studies, however, depends on the acceptance and practice of new teaching approaches in the classroom.

A survey of social studies materials from Newfoundland, and the other provinces, including Department of Education publications, selected textbooks, course descriptions, and teacher resource materials, indicates wide recognition and promotion of the interdisciplinary approach to social studies. It is often incorporated into texts and program materials, and highly recommended in teacher manuals and course descriptions as a teaching strategy, with or without appropriate program materials. The approach complements the thematic emphasis throughout the social studies program, as well as the emphasis on concepts and generalizations and the stress on problem-solving and critical thinking skills - all of which are very evident in these publications:

- Trends in Social Studies
- Living in Society
- Design for Social Studies
- The Master Guide for Social Studies
- Second Interim Report of the Junior High
Reorganization Committee
- Interim Social Studies, Grade 7-9
- Senior High Handbook and Course Descriptions

Certainly prospects for an expansion of the interdisciplinary approach in the classroom appear to be greater with the revised programs, and therein lie my interests.

Occasional mention is made in the above publications of the possibility for broadening students' perspectives on a theme, topic, or problem by including other school subjects to complement the social sciences. Music, art, literature, science, and even math have concepts rich with cultural heritage connotations, but only if students are taught to see the connections. Also, the curriculum intentions identified as Category B Intentions in the senior program, including critical thinking skills and problem-solving skills, could easily serve as interdisciplinary centers since they are supra-subject, permeating the entire curriculum as part of all course descriptions. Themes, concepts, skill - all have been

mentioned in the literature I have read as means to facilitate interdisciplinary studies.

Now that I have explained my intent, I would like to focus specifically on the following matters of interest to my thesis for your comments.

Textbooks and teacher resource materials

Providing texts and teacher aids with the interdisciplinary perspective "built-in" ought to clue teachers to the accompanying teaching strategy, yet teachers may not recognize the necessity for utilizing that strategy and thus defeat the purpose of the textbook. In other words, does providing the materials necessarily change a teacher's approach to teaching? Wouldn't a reliance on traditional "lecture and test" methods, and a dependence on the exclusion of individual teacher designed activities limit the success of the interdisciplinary intent of the text? I was thinking of courses such as Culture 1200, Canadian Issues 1201, World Problems 3204, and, of course, the new Grade 7 social studies course. Would not extensive inservice be needed to explain the concept of interdisciplinarity and teaching practices to accommodate the concept? Would not teachers need guidance in implementing interdisciplinary studies, in addition to suitable texts?

Possibilities for the interdisciplinary approach

Would you agree that the revised senior and the proposed junior high programs hold many possibilities for the interdisciplinary approach? Cultural Heritage 1200 is an excellent focus for joint ventures such as local projects lending themselves to exploration concepts covered in social studies. English, Industrial Arts, Family Living - all united in the study of local customs and traditions. Canadian Issues 1201 and Consumer Education 1202 also have activities that could be enriched by including several subjects not directly linked to the social sciences, such as Math and Science. Environmental education comes readily to mind.

What possibilities exist for locally developed interdisciplinary courses as credits under the elective's component of a student's program? Isn't there provision by the Department for local course development and alternate textbooks? Or does the bureaucracy discourage any teacher attempts at developing courses to suit local interests? The Master Guide seems to provide for courses to provide flexibility, to address the interests of students, and to

deal with themes of "local significance." (p. 41) That appears to be a rationale for an interdisciplinary approach to such courses.

Finally, mention was made earlier of the Category B Intentions described in the Master Guide. These are interdisciplinary in the sense that all course descriptions uphold them as applicable to all subjects in the curriculum. Yet, will teachers recognize the potential for interdisciplinary activity to teach and reinforce these attitudes, skills, and methods? It is my opinion that placing them in course descriptions is a necessary but not sufficient step to getting them recognized and taught across the curriculum, something else is needed to illustrate to teachers the "how to" of such an approach, be it inservice, summer institutes, or simply seminars in schools on the interdisciplinary approach to teach critical thinking, or problem-solving skills, to select just two examples. What implications does this have for the social studies program?

Writing this letter has been of benefit to me, since it helped clarify for me some aspects of my thesis topic. Any response you may have, however brief, would be greatly appreciated.

Sincerely,

George Chaulk



MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1B 3X8

Department of Curriculum and Instruction

*Index 01/10/11
Ed 1/10/11 11/11/11*

January 13, 1986

Mrs. Smita Joshi
Social Studies Consultant
Division of Instruction
Department of Education
St. John's, Newfoundland

Dear Mrs. Joshi:

I enclose a copy of a letter sent to Mr. James Crewe, Social Studies Co-ordinator for the Pentecostal Board of Education.

It deals with my interests in social studies as an appropriate vehicle for developing an interdisciplinary approach to teach in Newfoundland schools. While it is written to Mr. Crewe, it covers the topics I also wanted to discuss with you.

Your response would be welcomed and appreciated, since I need the Department perspective on my thesis topic.

Sincerely,

George Chaulk

APPENDIX B

AIMS
OF
PUBLIC EDUCATION
FOR
NEWFOUNDLAND
AND
LABRADOR

+

BULLETIN No. 2-A
DIVISION OF CURRICULUM

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Department of Education
St. John's
Newfoundland.

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Third printing, July, 1965.

Aims of Public Education for Newfoundland and Labrador

- A. Education is the process by which a human being is enabled to achieve his fullest and best development both as a private individual and as a member of human society.
- B. We believe that his best and fullest development can be achieved only in a Christian democratic society and that the aims of education, both general and specific, must be conceived in harmony with such a belief.
- C. We believe that one who has achieved his fullest and best development as an **individual** is one who, to the best of his ability,

(a) is possessed of a religious faith as maintained and taught by the church of his affiliation;

(Spiritual: Religious Training
and Exercises)

(b) is possessed of a sense of moral values, based on a belief in, and an earnest endeavour to practice and exemplify in his daily living, the virtues, both spiritual and moral, affirmed by his religious faith;

(Moral: Religious Training
and general moral precept
and example)

(c) is so developed and matured mentally and emotionally as to be able to live sanely, happily and satisfyingly, in harmony with himself and his individual circumstances both inherited and acquired;

(Mental - Emotional : a wholesome mental and emotional environment)

(d) has a mind whose critical and other faculties are so developed and trained as to enable him to cope successfully with the varied problems and situations that he may be expected to encounter;

(Mental - Intellectual : practical training and situations conducing to this end)

(e) has a knowledge, understanding, and appreciation of his human heritage, in all its principal aspects (aesthetic, scientific, economic, political, etc.), as well as a desire to make a positive contribution to it, and a knowledge and appreciation of the natural environment in which the human scene is set;

(Intellectual-Cultural : specific training and study in the Arts, Sciences, and Letters of mankind)

(f) has learned to occupy his leisure hours in keeping with his personal interests and capacities, and in a manner which is consistent with his moral and social duties, and the other attributes listed here;

(Cultural : Recreational)

(g) is possessed of physical health, and a knowledge of, and respect for, his physical body; as well as a desire, and a knowledge of how, to take care of it and its functions;

(Physical : a healthy environment, and specific training to this end)

and (h) — by way of summary — is one in whom the attributes and acquirements listed in sub-paragraphs (a) to (g) are harmonized and related in an all-round personality, whose "growth in wisdom and stature" is accompanied by "growth in favour with God and man".

- D. "In favour with man" introduces the second aspect of our definition of education. For, while insisting upon the individual importance and worth of every human being as such, and the necessity of his preserving his individuality and identity, as well as upon his right to the fullest and best development of which he is capable as an individual, we recognize that in actual fact he is a **member of human society**. Therefore, a primary function of education must also be to enable the individual to achieve his fullest and best development as a member of that society. But, in both capacities, or aspects of his life, he is, of course, the same person. Thus, what he is as a member of society will depend largely upon what he is as a private individual, and what he is as a private individual will depend largely upon what he is as a member of society. It is, therefore, self-evident that a person who has reached his best and fullest development as a member of society is one who **brings to all his social relationships, both private and public, the personal attributes and acquirements outlined above.**

We also believe that, in addition, he is one who (a) is possessed of other qualities, bearing more specially on one's social relationships, that may not be thought of as included in the various subdivisions of paragraph C,

such as sympathy, courtesy, tolerance, dependability, recognition of the rights of others, the ability to cooperate, assume responsibility, etc.;

(Social-general : a general environment as well as practical training and situations conducive to these ends)

(b) has a lively sense of his rights and responsibilities as a citizen, based on an understanding and appreciation of the various organizations and institutions of the community —municipal, provincial, national and international;

(Social-civic : practical training and situations conducive to these ends)

(c) has acquired the knowledge and skills of a profession, trade, or occupation that makes a necessary contribution to society; is impressed with the dignity and honourableness of labour; and is imbued with a sense of his responsibilities to his profession, his fellow-workers, and the public he serves.

(Social - vocational : practical training and situations conducting to these ends)

This philosophy suggests the following general objectives for education in Newfoundland schools :-

1. To help pupils understand the Christian principles and to guide them in the practice of these principles in their daily living.
2. To help pupils to develop moral values which will serve as a guide to living.

3. To acquaint pupils with the principles of democracy and to provide opportunities for the practice of these principles.
4. To help pupils to mature mentally.
5. To help pupils to mature emotionally.
6. To ensure that all pupils master the fundamental skills of learning to the limit of their abilities.
7. To provide opportunities for the development of pupils' abilities to think critically.
8. To help pupils to understand, appreciate and benefit from what is good and valuable in history, literature, science and the arts.
9. To help pupils make the best of their leisure time.
10. To help pupils understand the human body and practice the principles of good health.
11. To help pupils appreciate their privileges and responsibilities as members of their families and the wider community and so live in harmony with others.
12. To give pupils guidance in the choice of a career and to provide opportunities to begin preparation for occupational life.
13. To encourage pupils to strive for high standards in their work and to develop an appreciation and respect for the work of others.
14. To seek out and develop pupils' special talents and potentialities and to assist them in developing their strengths and in overcoming or adjusting to handicaps and weaknesses.

APPENDIX C

SELECTED RESOURCES FOR CULTURAL HERITAGE STUDIES

Magazines:This Land

This Land Magazine
P.O. Box 1814
Station C
St. John's, Newfoundland
A1C 2H4

Them Days

P.O. Box 939
Station B
Happy Valley - Goose Bay
Labrador
A0P 2J6

Docks Awash

P.O. Box 421
St. John's, Newfoundland
A1B 4B6

The Newfoundland Quarterly

Department of History
Faculty of Arts
Memorial University of Newfoundland
St. John's, Newfoundland
A1B 3X8

Newfoundland Studies

Department of English
Memorial University of Newfoundland
St. John's, Newfoundland
A1C 5S7

Newfoundland Lifestyle Language

197 Water Street
St. John's, Newfoundland
A1B 4J6

Atlantic Insight

Insight Publishing Ltd.
1668 Barrington Street
Halifax, Nova Scotia
B3J A2A

The Atlantic Advocate

P.O. Box 3370
12 Prospect Street West
Fredericton, New Brunswick
E3B 5A2

Information for implementing heritage projects:

Newfoundland Historical Society
 Room 15, Colonial Building
 Military Road
 St. John's, Newfoundland
 A1C 2C9

Museum Association of Newfoundland
 and Labrador
 P.O. Box 5785
 St. John's, Newfoundland
 A1C 5X3

Education Officer
 Newfoundland Museum
 285 Duckworth Street
 St. John's, Newfoundland
 A1C 1G9

Monument Kits
 Suite 1600
 444 No. Michigan Avenue
 Chicago, Illinois 60611
 U.S.A.

Centre for Newfoundland Studies
 Queen Elizabeth II Library
 Memorial University of Newfoundland
 St. John's, Newfoundland
 A1B 2J3

Hamilton, David, Local History in Atlantic Canada.
 Toronto: MacMillan Company of Canada Ltd., 1974

Newfoundland Studies
 Faculty of Arts
 Memorial University of Newfoundland
 St. John's, Newfoundland
 A1B 3X8

Canadian Studies
 Faculty of Arts
 Memorial University of Newfoundland
 St. John's, Newfoundland
 A1B 3X8

APPENDIX D

ASSOCIATIONS AND AGENCIES

Women's Studies

The Provincial Advisory Council
on the Status of Women
131 LeMarchant Road
St. John's, Newfoundland
A1B 4J6

The Council on Women's Issues
Newfoundland Teachers' Association
3 Kenmount Road
St. John's, Newfoundland
A1B 1W1

Women's Studies
Faculty of Arts
Memorial University of Newfoundland
St. John's, Newfoundland
A1B 3X8

Drug Abuse

Health Promotion Directorate
Health and Welfare Canada
Jeanne Mance Building
Tunney's Pasture
Ottawa, Canada
K1A 1B4

Addiction Research Foundation
School for Addiction Studies
8 May Street
Toronto, Ontario
M4W 2X1

National Film Board of Canada
Building 205
Pleasantville
St. John's, Newfoundland
A1B 2J6

Alcohol and Drug Dependence
Commission of Newfoundland and Labrador
Prince Charles Building
120 Torbay Road
St. John's, Newfoundland
A1A 2G8

Multicultural Education

The Multiculturalism Directorate
 Department of the Secretary of State
 Ottawa, Canada
 K1A 0T8

Cross-Cultural Communications Centre
 965 Bloor Street West
 Toronto, Ontario
 M6H 1L7

Newfoundland and Labrador Association
 for Multicultural Education
 P.O. Box 123
 G.A. Hickman Building
 Memorial University of Newfoundland
 St. John's, Newfoundland
 A1B 3X8

The Commissioner of Official Languages
 Ottawa, Canada
 K1A 0T8

The Minister of State for Multiculturalism
 Ottawa, Canada
 K1A 0T8

The Newfoundland and Labrador
 Human Rights Association
 141 Duckworth Street
 St. John's, Newfoundland
 A1B 2S4

Amnesty International
 Ottawa, Canada
 K1B 2T6

Nova Scotia Teachers' Association
 66 Driftwood Crescent
 Dartmouth, Nova Scotia
 B2V 1S7

Peace Education

Educators for Peace
 16 Smithville Crescent
 St. John's, Newfoundland
 A1B 2V2

Newfoundland and Labrador Animator for
Development and Peace
P.O. Box 312
Gander, Newfoundland
A1V 1W7

Roman Catholic School Board for St. John's
Belvedere Lane
St. John's, Newfoundland
A1B 2J6

Amnesty International
Ottawa, Canada
K1B 2T6

The Canadian Red Cross Society
7 Wicklow Street
St. John's, Newfoundland
A1B 2J4

Director, General Information
National Defence Headquarters
The Department of National Defence
Ottawa, Ontario
K1A 0K2

Peace 2000
120 Holland Avenue
Suite 500
Ottawa, Canada
K1Y 0X6

The National Film Board of Canada
Building 205
Pleasantville
St. John's, Newfoundland
A1B 2J6

Newfoundland and Labrador Peace Network
P.O. Box 13392
Station A
St. John's, Newfoundland
A1B 4B7

Academics for Nuclear Disarmament
Memorial University of Newfoundland
St. John's, Newfoundland
A1B 3X8

Canadian Catholic Organization for
Development and Peace
3028 Danforth Avenue
Toronto, Ontario
M4V 1N2

Canadian Coalition for
Nuclear Responsibility
P.O. Box 236
Snowdon, Quebec
H3X 3T4

Operation Dismantle
P.O. Box 3887
Station C
Ottawa, Ontario
K1Y 4M5

Project Ploughshares
Institute of Peace and Conflict Studies
Conrad Grebel College
Waterloo, Ontario
N2L 3G6

St. John's Plowshares
Box 13392
Station A
St. John's, Newfoundland
A1B 4B7

Environmental Education

The Environmental Education Committee
Roman Catholic School Board for St. John's
Belvedere Lane
St. John's, Newfoundland
A1B 2J6

Federation of Ontario Naturalists
355 Lesmill Road
Don Mills, Ontario
M3B 2W8

Alberta Department of Education
Devonian Building
11160 Jasper Avenue
Edmonton, Alberta
T5K 0L2

Canadian Wildlife Federation
1673 Carling Avenue
Ottawa, Canada
K2A 3Z1

Environmental Education Co-ordinating Committee
Newfoundland Teachers' Association
3 Kenmount Road
A1B 1W1

Breakwater Books Ltd.
277 Duckworth Street
St. John's, Newfoundland
A1C 2T4

Canadian Wildlife Service
Environment Canada
Ottawa, Canada
K1A 0E7

Newfoundland and Labrador Department
of Culture, Recreation and Youth
Youth Wildlife Division
Building 810
P.O. Box 4750
Pleasantville
St. John's, Newfoundland
A1C 5T7

Other

The National Association for
Core Curriculum, Inc.
407D White Hall
Kent State University
Kent, Ohio 44242

Institute for Educational Research
and Development
Faculty of Education
Memorial University
St. John's, Newfoundland
A1B 3X8

Canadian Society for the Study of Education
14 Henderson Avenue
Ottawa, Canada
K1N 7P1



