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ABSTRACT

This bibliography is based on the author's thinking and experience with implementing the unified education concepts through the team-taught Unified Studies Program at Boston State College, 1972-75. The purposes of the bibliography are to test a new approach to user-oriented bibliographical notes, provide information about how to find information concerning interdisciplinarity, and reshape the use of certain words (interdisciplinary, crossdisciplinary, multidisciplinary, transdisciplinary, and unidisciplinary). A user-oriented compendium, the bibliography is laid out developmentally--(1) getting ready to think about interdisciplinarity, (2) thinking about interdisciplinarity, and (3) implementing interdisciplinarity. It is personal, historical, and selective and focuses on theoretical and practical obstacles to interdisciplinarity. Several sources are included in each of the three sections and are briefly discussed in relation to the obstacles. (Author/ND)

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INTERDISCIPLINARITY: A SELECTED BIBLIOGRAPHY FOR USERS

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Les Humphreys

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INTERDISCIPLINARITY: A SELECTED BIBLIOGRAPHY FOR USERS

Les Humphreys (1975)

ABSTRACT

This bibliography on interdisciplinarity is a user-oriented compendium laid out developmentally: 1) "getting ready to think about interdisciplinarity; 2)"thinking about interdisciplinarity"; and, 3) "implementing interdisciplinarity. It is personal, historical and selective and has the aim of focussing upon four obstacles to interdisciplinarity:

* How does interdisciplinarity resolve the problem of generalist versus specialist education?

* How should educators deal with the multiple levels of interdisciplinarity?

* It is essential to - but is it possible to - create a new uniform language and set of research predispositions so that genuine transdisciplinary communication can take place?

* And how can instructional systems which are now so heavily weighted towards discipline oriented education be changed?

This bibliography comes out of the thinking and experiences of the author in implementing concepts of Unified Education through the team taught Unified Studies Program at Boston State College, 1972-1975.

INTRODUCTION

A bibliography is often little more than a list of references at the end of an article on a particular subject. Sometimes it is annotated. But seldom does it provide a user with a "process" for finding information.

The purposes of this bibliography are to test a new approach to user-oriented bibliographical notes; to provide information about how to find information concerning inter-

disciplinarity; and, to reshape the use of words like interdisciplinary, cross-disciplinary, multi-disciplinary, transdisciplinary, and uni-disciplinary. These words are now often used interchangeably, but as the field of interdisciplinarity develops, each will take on meanings and usages which must be differentiated.

This bibliography is for the general reader. It is personal, developmental, historical and highly selective. It assumes that the reader is just beginning to think about thinking about interdisciplinarity. It ends with the assumption that the reader will have amassed sufficient information to implement a curriculum of unified studies.

PART I - GETTING READY

To get ready to think about thinking about interdisciplinarity, I would suggest that the reader start with:

Loren Eiseley, The Immense Journey. (New York: Vintage Books, 1957)

R. Buckminster Fuller and Robert Marks, The Dymaxion World of Buckminster Fuller. (Garden City, N.Y.: Anchor Books, 1960, 1973)

Eiseley's book deals with time and space. Fuller's world is one of space and time. Since Einstein it has become necessary to devise a new metaphor for time. The pre-Newtonian concept that "time is like a river" no longer fits the world view of time/space relativity. What will this new metaphor be? And how will it enter popular consciousness? It may be that the

evolution of the awareness of the unity of time and space will in itself hold a key to the evolution of interdisciplinarity. One approach that I have been "playing" with lately is the idea that "time is a place". This has changed my thinking about interdisciplinarity considerably. Thus the progressive era in education might be thought to have been an exciting"place"in which to teach.

The purpose for reading writers like Eiseley and Fuller is that they free up the mind. What is at stake in the study of interdisciplinarity is, after all, a new paradigm. Teachers and learners who see education as a centrifugal fractioning process will never get to the point of seeing the centripetal power of integrative learning. Old paradigms give way to new ones because of anomalies. The Newtonian world view could not abide the mathematical inconsistencies found by researchers during the nineteenth century. The new paradigm which resulted has only partially infiltrated the public consciousness. To better understand the process by which this will happen, one should read:

Thomas Kuhn, The Structure of Scientific Revolutions, 2nd ed. (Chicago: University of Chicago Press, 1962, 1970)

This work is Volume II Number 2 of the projected International Encyclopedia of Unified Sciences and is subtitled "Foundations of the Unity of Science". It is really without common wonder that scientists were among the first to fraction learning (during the late Renaissance) and that they are now among the first to see the unity of scientific knowledge.

The term cross-disciplinary can adequately be used to describe the evolution of fields like bio-chemistry, bio-sociology and astro-physics. Teachers and learners who take their humanities seriously would do well to trace the problems raised by this evolution of cross-disciplinary research through the use of a book such as:

Isaac Asimov, Asimov's Guide to Science. (New York: Basic Books, 1972)

A next natural transition for humanistic educators might be the study of creative thinking through metaphors found in:

William J. Gordon, Synectics. (New York: Macmillan Co., 1968)

Since the Second World War, Bill Gordon has been using the process of synectics to help business people and academics solve problems metaphorically. Any trip to Boston, Massachusetts should include a visit to:

Synectics Education Systems, Inc.
121 Brattle Street
Cambridge, Massachusetts
(617) 868-5747

In sum, the study of interdisciplinarity should be begun within a context of questioning that may ultimately upset a teacher's/learner's paradigm about learning itself. Interdisciplinarity may lead the reader to see a wholly new way to think and learn. At the very least, it will open to question the efficacy of the current idiom concerning learning by discreet disciplines alone.

PART II - THINKING ABOUT INTERDISCIPLINARITY

The contexts for thinking about interdisciplinarity are not new. From Plato to Rousseau, the value of inquiry in a "whole" sense is either overtly touted or covertly practiced. But with the confluence of the scientific and commercial (r)evolutions of the sixteenth through eighteenth centuries, and the addition of the industrial (r)evolution preceding World War One, the pattern of "learned learning" becomes one of increasingly fractioned studies by discipline.

Critics of this "traditional liberal" model of education do not find the analogy of the education industry to the factory system too tart. They see schools in the twentieth century as assembly lines (K through college) with teachers acting as quality control inspectors certifying students as running from "grade A" to reject and recycle. Educational architecture mimics the textile mill. Punch clocks and bells start and stop learning. And the curriculum is rationalized into discreet units of production: a time for reading, a time for geography, a time for composition, and a time for nature study.

While this factory model for traditional liberal education grates the sensitivities of those who see teaching as a form of art, it is not far from the mark in representing accurately the needs of an industrialized society that have been appliqued upon its educational substructure. In all

candor it must be recognized, however, that this form of fractioned learning has indeed served industrial society well - producing (and that word is carefully chosen) a goodly number of doctors, engineers and poets.

Some, however, will argue that in a "post-industrial" world that a quite different set of social needs must be served by schools. For me the watershed year was 1970 when

Charles Silberman, Crisis in the Classroom. (New York: Random House, 1970)

appeared. Prior to Silberman's study the bulk of the new writing (by Goodman, Holt, Kozol, Dennison, Leonard, Friedenberg, et al.) tended to articulate only what was "wrong" with the traditional liberal model (and its "reformed" post-Sputnik varieties). Crisis in the Classroom collects all of these critiques in poignant sequences reminiscent of Frederick Weismann's film "High School" but then goes on to offer new alternatives based upon the experiences of the integrated day programs which evolved in post-war England. This transition is crucial. Since Silberman's writing, educators seem to be getting down to the nitty gritty of changing (as opposed to reforming) liberal education.

The underpinnings for these changes have come, ironically enough, from a revolution which failed: the progressive era. In a biased and grossly simplistic way, I see the broad brushstrokes of the past two hundred years as having created a view something like this: Liberal ideology supplanted absolutism (usually by revolution) during the eighteenth and

nineteenth centuries. A variety of socialist ideologies came to dominate political and educational thinking in the non-industrialized world during the nineteenth and twentieth centuries and these ideologies have melded with traditional liberal capitalism (since the 1930's) in such places as the United States, Russia and western Europe. The populist and progressive movements of the period 1870 to 1940 were cut short respectively by the First and Second World Wars. But it is these ideologies which are now finding renaissance in the "cooperative" (i.e. populist free school) and "open" (i.e. neo-progressive school) movements of the 1960's and 1970's.[1]

In order to think about interdisciplinarity, the reader should, therefore, think about the success and failure of the first progressive movememnt in education by reading:

William James, Talks to Teachers on Psychology: (New York: Dover Publications, 1899, 1962)

John Dewey, Interest and Effort in Education. (Carbondale, Illinois: Southern Illinois University Press, 1913, 1975)

A.N. Whitehead, The Aims of Education (New York: Free Press, 1929, 1967)

And the best chronicle of a college that I know of which spans the latter years of the progressive movement is:

Martin Duberman, Black Mountain. (Garden City, N.Y.: Anchor Books, 1973)

The "new historiography" presented by Duberman is remarkable,

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[1] I initially felt that I should apologize for these generalizations as not being complex enough, but then realized that it is simply my training in discipline oriented education which makes a taboo of generalization.

and if I had to select but one road map for educational innovation, this would probably be it.

A note of warning. Interdisciplinary "innovators" who "get into" progressive ideology should sense the tightness and rigorousness requisite for neo-progressive thought. The conservative critique by:

> Sidney Hook, "John Dewey and his Betrayers" in C. Troost (ed.), Radical School Reform (Boston: Little, Brown, 1973)

is fully warranted. "Free" schools have gotten a bad name within the educational establishment because they read the word "freedom" in Dewey but did not see the words "responsibilty" and "social need".

* * *

The next step (both personally and chronologically) in thinking about interdisciplinarity is to become familiar with the evolution of the "integrated day" programs found in the British model of open education. Some information will already have been found in Silberman's Crisis in the Classroom, but a short book that I see as particularly useful is:

> Joseph Featherstone, An Introduction: Informal Schools in Britain Today. (New York: Citation Press, 1971)

Featherstone's comment that the curricula of the primary schools in England are evolving mostly from teachers rather than devolving from curriculum designers is particularly interesting. Teachers themselves must be the first to see the need for integration of the disparate activities in which they are involved.

A new bibliography is now available which will provide additional information on the English models:

John McNicholas, The Design of English Elementary and Primary Schools: A Selected Annotated Bibliography. (New York: Humanities Press, 1975)

The thinking about interdisciplinarity going on in other parts of the world seems to me to be far more advanced than the ad hoc "programming" and "curriculum creating" that occupies much of the literature on interdisciplinarity in the United States.

If I had to select but three sources on interdisciplinarity to provide philosophical depth for thinking about the concept, they would be:

Jean Piaget, Main Trends in Interdisciplinary Research. (New York: Harper and Row, 1970, 1973)

Centre for Educational Research and Innovation, Interdisciplinarity: Problems of Teaching and Research in Universities. (Available from OECD Publications Center, 1750 Pennsylvania Avenue N.W. Washington, D.C. 20006) 1972

Erich Jantsch, "Inter- and Transdisciplinary University: A Systems Approach to Education and Innovation" Higher Education I:1 (February, 1972), 7-37

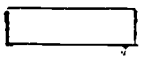
The problems cited by these sources, and the maps drawn for future thinking about interdisciplinarity include some thorny patches that any educator who wishes to "get above" disciplinarity must sooner or later deal with:

* How does interdisciplinarity resolve the problem of generalist versus specialist education?
* How should educators deal with the multiple levels of interdisciplinarity itself?

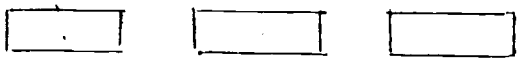
* It is essential to - but is it possible to - create a new uniform language and set of research predispositions so that genuine transdisciplinary communication can take place?
* And how can instructional systems which are now so heavily weighted towards discipline-oriented education be changed?

It is clear that interdisciplinarity is an umbrella term. Jantsch provides a hierarchical framework within this term:

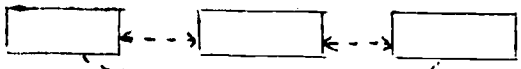
Disciplinarity - specialization in isolation



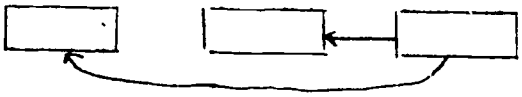
Multidisciplinarity - no cooperation



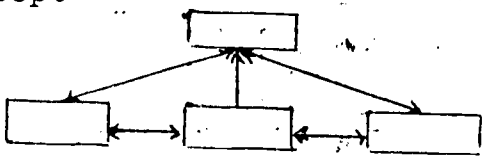
Pluridisciplinarity - cooperation without coordination



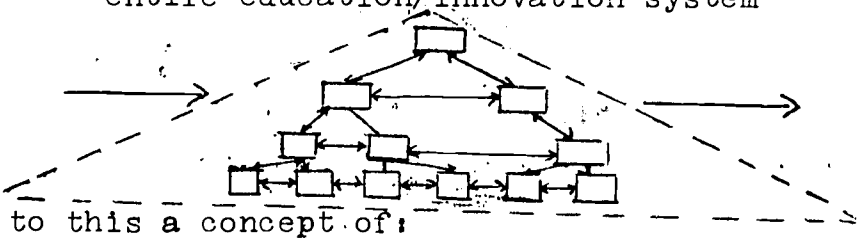
Crossdisciplinarity - rigid polarization toward specific monodisciplinary concept



Interdisciplinarity - coordination by higher level concept

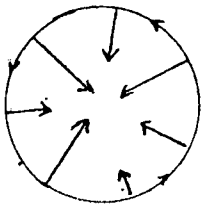


Transdisciplinarity - multilevel coordination of entire education/innovation system



I would add to this a concept of:

Unidisciplinarity - humanistic, holistic, generalist and positivist



See:

Les Humphreys, "Concepts of Unified Education" Unified Studies Reports I:2 (1974) Boston State College, Boston, Mass., 02115

The choice of which level to work on in interdisciplinarity is critical. A teacher who simply wants to "work with" another instructor in another discipline is probably going to be doing multi= or pluri-disciplinary thinking. A research psycho-historian will probably be cross-disciplinary. But a university (or R & D group) with a truly transdisciplinary systems approach to innovation will be doing quite a different sort of thinking. When one adds to this choice a cross matrix of problems concerning research terminology to be used; the level of generalization/specialization desired; and, the kind of predisposition (e.g. inductive/deductive) with which one approaches a problem, the situation becomes exceedingly complex.

The user of this bibliography is cautioned to first clarify "policy" before embarking on "planning". The failure to do so seems to me to be the key to the failure of interdisciplinary experiments in the United States.

PART III - IMPLEMENTING INTERDISCIPLINARITY

After having "gotten ready" and having "thought about" interdisciplinarity, the user of this bibliography may have come to the conclusion that the anomalies of discipline oriented educational practices are of such magnitude for our post-industrial world - and the problems of structuring inter-disciplinarity are of such value and challenge - that within the context of one class, or one school, or one university that interdisciplinarity (at some one or more of its levels) should be tried. The obvious next step is to cast glances at teaching styles and unified studies programs which have already been tried.

A beginning can be had by looking at:

Noel McInnis "Teach the Earth Whole" ERIC Resources in Education #ED 055021 (1971)

Gary C. Shaw and William D. Crist, "An Inter-Disciplinary Team Teaching Experiment" Improving College and University Teaching XXI #2 (Spring, 1973), 159-60

Charles B. Fethe, "A Philosophical Model for Interdisciplinary Programs" Liberal Education LIX #4 (December, 1973), 490-97

Muzafer and Carol Sherif(eds.), Interdisciplinary Relationships in the Social Sciences. (Chicago: Aldine Publishers, 1969)

M. Landau, H. Proshansky and W. Ittelson, "The Interdisciplinary Approach and the Concept of Behavioral Science" in N. Washburne (ed.), Decisions, Values and Groups, II (New York: Macmillan Co., 1962), 7-24

Harry Finestone and Michael Shagure, Prospects for the 70's: English Departments and Multi-Disciplinary Studies (New York: Modern Language Association, 1973)

Next one should examine the evolution of programs in the two areas which seem to be farthest along in the growth of interdisciplinarity: unified science education, and environmental education:

Federation for Unified Science Education (FUSE)
Dr. Vicktor Showalter
Box 3138 University Station
Ohio State University
Columbus, Ohio 43210

"New Trends in Integrated Science Teaching"
(Available from: UNESCO, 7 Place Fontenoy
75700 Paris, France)

T.B. Colwell, "The Laying on of Environmental Education" The Review of Education I #3 (August, 1975), 390-401

There are dozens of programs in these areas (cf. Yellow Pages of Undergraduate Innovations, Change Magazine, 1974) including the Unified Science Study Program at MIT, the Monona Grove Four Year Unified Science Program, the Scottish Integrated Science Scheme, the British Open University Courses in Science and Technology, the California State Department of Education Program in Ekistics, the Ideas Program at Austin College and curricula at such places as Hiram College, Temple University, Northland College and the Evergreen State College.

The ERIC system of information access is probably the best research tool for finding information concerning specific teaching styles and programs in interdisciplinarity. At the risk of offending readers who are familiar with ERIC, and because the system is relatively new, I would like to sketch out the process for using this resource collection:

ERIC is the Educational Resources Information Center (National Institute of Education, Washington, D.C. 20208) This is a federally sponsored agency with regional clearinghouses for information about education.

RIE is a compendium of Resources in Education (formerly called Research in Education, 1967-1974) and is a computer based catalogued and abstracted collection of both published and unpublished documents (including Office of Education research contract reports, etc.). Reports are given ED identifier numbers, are indexed and most are made available in either hard cover or microfiche formats from:

EDRS - the ERIC Document Reproduction Service, P.O. Box 190, Arlington, Virginia, 22210.

CIJE is the Current Index to Journals in Education and is also computer based. For the past five years, CIJE has been an abstracting and indexing resource for over seven hundred journals in the field of education.

Taken together, RIE and CIJE provide access to abundent sources of information concerning programs involved in interdisciplinarity.

The quickest (and yet trickiest) method for getting ERIC information is to have a library or regional center with appropriate facilities conduct a "computer search" for bibliographical citations and document abstracts. This is a relatively inexpensive process (considering the time saved), but does require familiarity with:

ERIC, Thesaurus of ERIC Descriptors (5th edition) (New York: Macmillan Co., 1974) updated in current issues of RIE.

Selecting the best descriptors for the computer search is difficult. The usual process is to "cross" a major descriptor

with a number of related minor descriptors. For example:

Major Descriptor	Cross Descriptors
UNIFIED STUDIES PROGRAMS or INTERDISCIPLINARY APPROACHES	CURRICULUM DEVELOPMENT EDUCATIONAL PROGRAMS INTEGRATED CURRICULUM FUSED CURRICULUM FUTURES (OF SOCIETY) LEARNING PROCESSES TEACHING TECHNIQUES INTEGRATED ACTIVITIES (etc.)

The print outs that result from this sort of search will produce hundreds of journal article citations and abstracts (CIJE) as well as published and unpublished reports, studies, program notes, etc. (RIE). These can be the basis for planning interdisciplinary programs that will succeed.

Again, I apologize to readers who are already familiar with the workings of the ERIC system, but it is the most valuable source of information in quantity of which I am aware, and it should not be passed over lightly.

SUMMARY

This bibliography has attempted to be both developmental and user oriented. It began with the assumption that the reader was getting ready to think about thinking about interdisciplinarity. And it proceeded through personal and historical steps to deal with the problems raised by thinking about and implementing interdisciplinarity. If indeed it has proved useful, the author would like to receive "feedback" from the reader:

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