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ABSTRACT

Research toward the development of a theory of independent study and telemathic, or distance, learning is discussed in this paper. The concepts of independent study, educational programs, learning programs, teaching programs, and telemathic teaching are defined, and telemathic teaching programs are classified according to distance between teacher and learner, using the variables of dialogue and structure. The variable of learner autonomy in educational programs is considered, and independent study programs are classified according to learner autonomy and distance. A study comparing field dependence and attitudes of learners in a high autonomy/low distance program with students in a low autonomy/high distance program is described. The following findings are summarized: (1) students in the more distant form of independent study were more field independent than the norm, but students in the autonomous program were not; (2) more autonomous than distance students preferred distance over non-telemathic teaching and autonomous over non-autonomous learning; and (3) field independence might be used as a predictor in distance study, e.g., as distance becomes less, a more field dependent cognitive style is desirable. Areas for further research are suggested, and 34 references are listed. (MES)

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Introduction: The "Copernican Revolution" in education

In the past thirty years and especially during the past decade there has occurred in education what U.N.E.S.C.O.'s Henri Dieuzeide has called a "Copernican Revolution", a transfer of the centre of gravity of educational thinking and research from the functions and activities of teachers, the "teacher centered mentality", to the behaviours of learners, the "pupil centered approach".¹ The change has been described by a prominent Australian broadcaster as the "decentralisation of learning".²

In earlier times, when the centre of the educational universe was the teacher, emphasis in teacher training and in research was on the identification of those actions of the teacher that would stimulate in students the responses thought desirable by the teacher. In such centralised learning systems it was necessary for students to cluster around teachers in "classes", and teachers had to know how to plan what would be learned, how to implement various strategies supposed to promote learning, and how to test to obtain evidence of the effectiveness of their strategies.

A distinguished British educator, Edith Moorhouse writes of elementary school teaching as it was forty years ago:

the emphasis in teacher training was on the techniques of holding the attention of a class of children: the question at the appropriate moment when attention began to lapse, the raising of an eyebrow, the quick drawing on the blackboard. ...The teacher stood in front of the class of children of one age group who sat in straight rows facing the blackboard and talked to and questioned the children for much of the day.¹

Teacher centred education has not been confined to the elementary school. "Universities have existed for over a thousand years", writes Brown, but

From the very beginning of organized higher education, teachers and professors have presented a united front against the notion that students will learn just as much, and possibly a great deal more, if permitted to learn on their own initiative rather than as a captive audience in the classroom. At no point in the history of education have schools and universities allowed students the autonomy which is necessary in the learning process.²

According to both Moorhouse and to Muir,³ the change to a learner centred educational universe has been due to a growing acceptance by learners and teachers of three basic principles long discussed by educators but not widely acted upon. The first of these is the recognition that each individual learns each content area or skill in different ways, and

probably at different times from other learners; if learning has any one characteristic it is idiosyncrasy, and the concept of a "class" of learners is therefore a foolish paradox. The second principle is that effective learning is experiential; whether interpreted in a phenomenological or behaviourist's framework, the principle is that one can best learn by experiencing. The third principle is that learning in the new world of rapid change must be lifelong, so that in youth one need not learn enough for a lifetime, but must acquire the skills to be a responsible continuing learner in adulthood.

The role of the teacher in the new learner centred educational universe, at its simplest, is not so much to "instruct" as to provide an environment in which each individual learner is able to identify what he is ready to learn, and in which he has access to a large variety of resources for learning. In particular, the school teacher tries to provide a rich supply of materials:

Materials of every kind should be available; basic materials, such as sand, water, clay and wood; a collection of junk, boxes containers of every size and shape in wood, cardboard and plastic; a wide variety of cardboard and paper in different shapes, sizes, thicknesses and colours; paints (water, oil and emulsion), pens charcoal, pencils, a variety of brushes, crayons, in fact all kinds of media for making marks that a child can explore; a variety of pastes and glues that do the job expected of them; scissors that cut; benches, a vice, and tools; an assortment of materials to stroke and use - velvet, silk, satin, wool, cotton, linen, fur, nylon. Each item has a different quality that can only be fully appreciated by handling and using and coming to terms with the discipline they impose. All these materials may be used at the child's own stage of development and maturity; one child might be at the stage of pitting his own strength against boxes and planks and yet be able to join in with a group of children of varying ages and abilities who are constructing a telescope or a space ship - that will hold several children - imaginative, constructive work which is the basis of mathematics.

By providing a richness of materials, and being both non-directive and responsive, the learner centred educator gives the learner opportunity to learn what is important for him at a particular time in his growth, gives opportunity to learn by experience, and gives opportunity to learn to exercise choice and responsibility in making educational decisions. As a result, from the schools - not all schools, but many - is emerging a generation of new adult learners that knows how to learn, and a

generation of teachers that knows how to facilitate independent study. The expectation of these learners is that in adulthood, as in school, their learning will be self directed, and when they identify learning needs they will be able to call upon the sources of information and training they require to satisfy their needs.

The response of institutions of higher education to this expectation, is suggested in a report from the University of Notre Dame:

Institutions are responding with programs to support the new learning styles emphasized by the need for lifelong learning. And those programs of continuing education seem likely, for a variety of reasons, to experience rapid growth in the years ahead. This growth will come about without any substantial changes in national policy. As a matter of course, formal educational institutions will expand their offerings to accommodate an increasing demand for external degrees, individualized off-campus study, correspondence study programs, and other modes of reaching the varied interests of students.⁶

Together with the pressure from students, the design and development of "other modes of reaching the varied interests of students" is the second development that has brought independent learners to the foreground of current educational research. At the very time that demand for learner freedom has increased, a plethora of new communications devices has made it possible for institutions to respond in efficient ways to that demand. Designed according to systems design principles, instructional programmes may now provide an efficient exposition by any of the world's authorities on any subject to individual learners, communicated to them by means of the computer, television, radio, video-cassette, audio tape, telephone, and in print. Using such programmes, each learner has the universe for a classroom, and an abundance of material and human resources. As a child-centred teacher provides a rich environment of learning materials, and responds to the self directed learning of the individual pupil in the classroom, the higher education institution now has the technical power to respond to each individual adult learner as, in his interaction with his adult environment, he identifies learning needs and makes them known, and enters into programmes of independent study.

Henri Dreuzeide describes two kinds of technology based educational institutions, one of which is a community educational resource centre offering

a community service of individualized self-instruction for safeguarding individual freedom of action - a complete self-service system adaptable to individual needs, to which the pupils would feel an allegiance based on individual involvement.⁷

By contrast with the cloisters of the traditional campus, where teachers tried to transmit knowledge to learners in an environment sheltered from the outside world, this new kind of institution is not a place to which people travel, but a resource centre from which they draw out the information and the skills they need. The material they require is communicated through appropriate media, having been prepared and packaged in advance, in anticipation of learners' demands. Learners using these systems are independent in two senses of the term, for they are physically independent of the need to be resident on a campus, and they are independent of the control of their learning by pedagogues. The institution is "teaching at a distance".

The following description is of a typical university Independent Study and Distance Teaching venture, the University Without Walls, which is a consortium of twenty-seven participating American colleges and universities.

Each student outlines his learning objectives and designs a study program leading to goal achievement from a list of hundreds of opportunities for independent study. Among the possible options are regular course work at any of the participating institutions, internships or jobs, programmed materials, and even travel. UWW students graduate whenever they have achieved their learning objectives.

Purpose of this Paper

What has been described above is a renaissance of interest in independent learning and the teaching of independent learners. We have a vast array of new research and development questions in the universe of education, some of which we will introduce for your consideration at the conclusion of this paper.

Our first task however, and the main purpose of our colloquium today, is to focus our attention upon an enterprise in which we have been engaged in recent years, namely the statement of what Independent Study and Distance Teaching are, and the construction of a conceptual framework of the field. Since 1970 we have developed the theory on the basis of a typology of programmes which was itself based on the characteristics we identified as critical elements of Independent Study and Distance Teaching programmes. In this paper we will provide a brief history of our progress in pursuit of the theory, after which we will describe, again briefly, the typology and the concepts associated with it, and in conclusion will mention one research project which has been completed, and other questions of interest for future consideration.

Although we had some experience of the use of correspondence and of radio and television in adult education before going to the United States in 1970 it was not until we joined Charles Wedemeyer at the University of Wisconsin that Independent Study and Distance Teaching became a major professional preoccupation. Wedemeyer was by then the leading American thinker about Distance Teaching and had recently returned from Great Britain where he had been a consultant in the establishment of the Open University. We moved together into a project to design an Open School for the State of Wisconsin⁹, and a score of other projects followed, ranging from "Edsat", the use of the orbital satellite in education, and the state Educational Telephone Network, to the development of disposable slides and flimsy audio discs for correspondence students. However, this exciting and demanding work was the cause of cognitive dissonance when we held discussions with educationists in the Faculty of Education, for they usually spoke of education as synonymous with school teaching of children in classrooms, and even adult educators seemed to regard education as a social activity, almost always conducted in groups. In our academic activities we were constantly faced with the need to transpose theoretical concepts from the domain of child education to adult education, and from the classroom and the group to settings which were unnamed, but were obviously not group settings.

When we studied the research in education we read, for example, that:

"The ultimate goals of research on teaching are theories of teaching, and these in turn involve the development of a critical language for the analysis of classroom behaviour,"¹⁰ and "researchers are becoming increasingly concerned with what actually happens in classrooms"¹¹ and, "...the word instruction refers to the activity which takes place during schooling, and within the classroom setting"¹².

Even in the literature of adult education, in an inventory of the research compiled for the Adult Education Association of the U.S.A., De S. Brunner, one of the senior professors of adult education in the U.S.A., and his colleagues included a whole chapter on "The Use of Discussion", and another on "Group Research and Adult Education", but made no mention at all of correspondence teaching. There were some references to radio and television, classified as audio-visual aids, but the bias, even of literature as prestigious as this was

"Clearly adult education will take place in groups almost exclusively".

It was clear that a vast number of adult learners were receiving instruction in non-group settings, and we concluded that educational theory which did not provide a place for such learning and teaching was incomplete, and unsatisfactory. After a year, we summarised our dissatisfaction in a paper, which included the following:

"teaching consists of two families of activity with many characteristics in common, but different in one aspect so important that a theory explaining one cannot satisfactorily explain the other.

The first of these families, the older, better understood, more fully researched, includes all educational situations where the teacher is physically contiguous with his students, so that the primary means of communication is his voice, and in which (to use the economists terms) teaching is a "service" that is "consumed" simultaneously with its "production". The physical proximity of the learners with the teacher permits each to stimulate the other, consequently teaching of this kind is conceived as a process of "social interaction".

After elaborating on teaching as a process of social interaction, we continued:

"The second family of teaching methods, and the subject of our concern, includes educational situations distinguished by the separation of the teacher from his learners, so that communication has to be facilitated by a mechanical or electronic medium. Teaching in this environment is "consumed" at a time or place different from that at which it is "produced", and to reach the learner it must be contained, transported, stored and delivered. There may be interaction, between learner and teacher, but if so, it is so greatly affected by the delay resulting from the necessity to communicate across distance or time, that it cannot be an assured component of teaching strategy, as it may in classroom or group teaching. We refer to this as DISTANCE TEACHING, to distinguish it from "contiguous teaching" where teacher and student are in physical proximity".

We argued that we could anticipate a growth in distance-teaching, and stated that:

"we believe the time is appropriate for an examination of the methods now in use, in the hope of identifying the characteristics that distinguish them, and that can be used to show the relationship between them. We are of course not concerned with the "hardware" characteristics of the media, but with the Educational characteristics. Our search then is aimed at bringing together into a system, the discrete observations and definitions of researchers and practitioners in a number of separate, yet we believe, related teaching methods. As we examine the methods we will ask questions like:

What learning theory is assumed, or stated, by teachers using these methods? Are there differences between teachers?

The starting point was our early definition of the kind of educational relationship we would study, we called this "distant learning and teaching" and defined distance teaching as follows:

"Distance teaching may be defined as the family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, including those which in a contiguous situation would be performed in the learner's presence, so that communication between the teacher and the learner must be facilitated by print, electronic, mechanical or other devices."

From our present perspective it can be seen that our method, though we meant to be inductive was rather more of the kind Melvin Marx has called "functional"¹⁵, there being a continuous interaction between conceptualisation and data. It was from the concept of separation of learner and teacher that we derived the concept Distance, which was crucial in determining the selection of data for study which in its turn eventually provided us with our theoretical framework.

Following our definition, we generated a classification of programmes where "teaching behaviours are executed apart from the learning behaviours". We classified by the variable "medium of communication".

The media we listed at that time were: radio, television, dial access tape systems, computer assisted instruction, programmed instruction, textbooks, telephone and correspondence. A persistent intruder into this classification by medium was the wealth of so-called "independent study" programmes on university campuses, characterised by separation between learner and teacher for most but not all of the relationship, but not clearly characterised by a communications medium. This was a problem we were forced to return to in time.

A next major advance in the classification by medium was the identification of two variables, Individualization and Dialogue. A programme was said to be individualized to the extent to which a learner could control the pace at which he received information and at which he was compelled to make his response, while Dialogue described the extent to which the media of a programme made it possible or impossible for a learner to interact with the teacher. Perhaps the point can be illustrated by our own experience of that time when ^{we} were leading a telephone-teaching group. We obviously were in a distance teaching situation, which was one where dialogue was possible, since any student could respond to the distant

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"assumptions about learning - within each method, and between methods?"

Are there differences and similarities in goal setting? In Evaluation? Is there dialogue between teacher and learner? How much provision is there for learners to contribute to programme planning and evaluation? How do leaders in each method define the nature of their method? Do these methods appeal to different kinds of adult learners? What kinds of programmes are provided?"

As the problem became clarified, we sought a method for dealing with it, and were influenced by the success of John Buskey, who had developed a typology of residential adult education programmes.

He had "focussed upon a holistic impressionistic study of programmes with a view towards sorting them into groupings of seemingly similar programmes" and we decided to focus in a similar manner on "an impressionistic study of a selected sample of literature, including descriptions of programmes, but including also theoretical papers and reported research"⁽¹⁴⁾. The research question as it was defined a few months later was:

"Does an analysis of selected literature of the various methods used to instruct independent learners reveal a pattern of educational elements that can be used to differentiate the field and define it?"

Since the parameters of the universe we proposed to explore were quite unknown, it seemed best to gather as large and various a sample of literature as we could. We were assisted by a professional librarian, and received other supporting services in the University of Wisconsin Educational Satellite project. We selected eventually more than 2000 items of literature pertaining to educational programmes in which learners were not in face-to-face relationships with teachers. We prepared abstracts on postcards, and it was these that we manipulated and classified in search of the key variables which would enable us to define and describe our field.

This is not the place to describe in further detail the different attempts we made in 1971 and 1972 to build a theoretical framework from this data, for it is more important that we now proceed to consider the framework which eventually appeared. However, two further points about the past must be made before we go on, for one was a starting point, and the other a turning point.

teacher, but in which the teaching was prepared for, and directed to a typical learner, but to no particular learner. The programme was as un-individualized as the "mass" medium of radio, yet considerably more "dialogic". Using these variables, we ordered our media as follows:

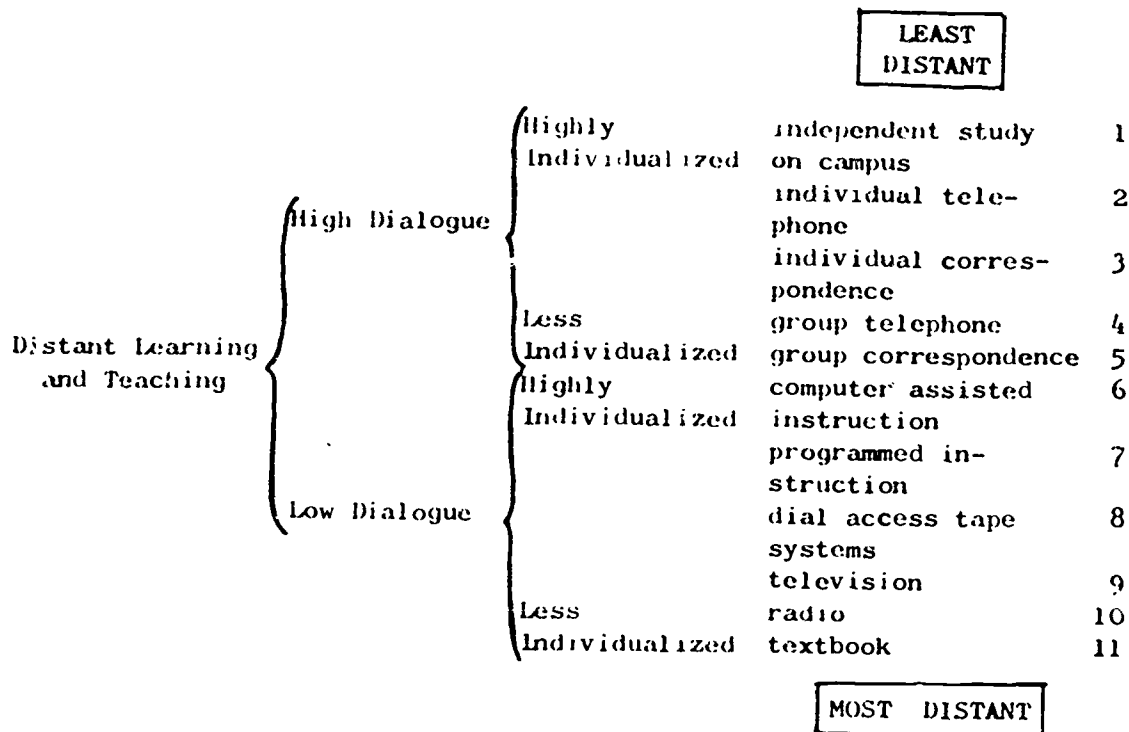


Fig. 1 Distant Learning and Teaching, Methods classified by the Dimension of Distance.¹⁶

We concluded that in a theory of Distance Education, Distance was not to be measured in physical terms, in miles or in minutes, but in the extent to which a particular teaching - learning relationship was individual and dialogic.

The second point from the past we wish to make, is what we previously referred to as the turning point, and arose from our attempts to organise the literature of independent study on campus environments.

As in many other countries, in American Universities for at least half a century there had been various arrangements to permit selected students to follow personal study programmes, and to prepare papers or engage in personal research projects. These programmes were once called "honor. courses", since they were restricted to only the more intellectual students, but after a national conference in 1925 became known as "independent study"¹⁷. By 1967 independent study was available in 90% of American universities¹⁸. We studied numerous definitions of this kind of independent study, including Baskin's:

"Independent Study is defined as independent work or reading, sometimes on one's own, sometimes in small groups, but with such work taking place in the absence of the teacher and in lieu of certain regularly scheduled class meetings."¹⁹

Alexander and Hines defined it thus, "Independent Study is learning on one's own,"²⁰ and the National University Extension Association called it:

"a teaching-learning process in which the student studies primarily in a non-classroom situation remote from, and independent of direct, sustained face-to-face contact with the professor during the duration of the course".²¹

What went on under the name of independent study was:

- (a) Carried on apart from teaching,
- (b) Carried on by individual learners, and therefore appeared to belong in the universe of Distance Teaching.

However other definitions of this kind of instruction introduced other significant variables. MacDonald stated that the independent student was free to pace his learning according to his own circumstances and needs, and was free to choose among various channels, or resources for learning.²² Trump wrote that "The individual student is given responsibility for the completion of work he helps to choose for himself. It includes students setting their own rate of progress through the use of teaching machines, libraries, language laboratories, and science laboratories"²³. The more literature we searched, the more clearly the variable of Learner Responsibility became evident. Alexander and Hines wrote, "Independent Study is considered by us to be learning activity, largely motivated by the learner's own aims to learn and largely rewarded in terms of its intrinsic values"²². Dressel and Thompson provided the term we eventually employed in our theory, in defining independent study as:

"The student's self directed pursuit of academic competence in as autonomous a manner as he is able to exercise at any particular time."²⁴

From our study of independent study on campus, a field with considerably more literature than the distance teaching field, and only a few items of which have been mentioned here, we deduced the following characteristics of such educational programmes, in addition to (a) and (b) above:

- (c) In Independent Study the learner chooses when and where to study, at what pace, and by which methods,
- (d) The learner chooses what to study,
- (e) The learner is self motivating,
- (f) The learner is self evaluating.

We then classified programmes in our collection of literature, by the variables of Learner Autonomy.

In 1972 a typology with programmes classified by Distance and by Learner Autonomy was presented to the International Conference on Correspondence Education. What follows in the next part of this paper is the outline of that concept, with some modifications and refinements of recent rewriting.

Part 2: Summary of the Theory of Independent Study

Definition 1: Independent Study is any educational programme in which the learning programme occurs separate in time and place from the teaching programme, and in which the learner has an influence at least equal to the teacher in determining goals, resources, and evaluation decisions.

As defined, Independent Study is a generic term describing a major category of educational transactions, which are classified by the differentia "distance", i.e. "the learning program occurs separate in time and place from the teaching program," and "autonomy", i.e. "the learner has an influence at least equal to the teacher". Perhaps to those meeting it for the first time, the use of the word "Independent" is misleading, since it might suggest the student is a kind of Robinson Crusoe, cast away on an island of self-sufficiency, which is not the sense in which the term is used. The independent student is engaged in an educational programme, which by definition implies both a learner and a teacher or teachers in a transactional relationship. Thus:

Definition 2: An educational programme is the use in a learning programme of a teaching programme.

Definition 3: A learning programme is a set of learner's objectives for his change in skills, attitudes or knowledge, a set of resources and procedures for reaching the objectives, and a design for measuring the achievement of the objectives.

It should be emphasised that we are distinguishing "learning" and "learning programme", which is synonymous with "study". Of course all humans are learning at all times of consciousness, but such is casual learning, random,

uncontrolled, usually unconscious. A learning programme is a deliberate, purposeful and planned sequence of activities, which usually makes use of agents or helpers, who may be called facilitators, instructors, or teachers.

A teaching programme is equally deliberate and carefully planned:

Definition 4: A teaching programme is a set of teacher's objectives for change in learners' skills, attitudes or knowledge, a set of resources and procedures for reaching the objectives, and a design for measuring the achievement of the objectives.

It will be argued that deliberate learning can be without teaching, and if indeed a learner can establish objectives and achieve them using no resources or procedures prepared by another, and if he can evaluate his achievement, a learning programme without teaching will occur. The self taught ornithologist who knows about birds from his years of field study must be a good example of a learning programme without teaching, though if he resorts to a guide-book he is, though still highly independent, engaged in an educational transaction, since the book was written deliberately to assist his learning, by one whom we call a teacher.

The Variables of Apartness

Definition 5: Distance, or Telemathic Teaching is a teaching programme in which, because of the physical separateness of learners and teachers, the interactions between them are conducted through print, mechanical or electronic devices.

Telemathy means "learning at a distance," and is a word formed by combining the terms "tele" and "mathy", meaning respectively "far off" or "at a distance," and "mathy" from Greek "mathein," "to learn", as used, for example in "opsimathy", to learn in later life, and in "mathematics". Telemathic teaching is teaching in support of learning "at a distance". Independent study programmes vary in the extent to which there is distance between teacher and learners. What makes a programme more distant than another, making one programme of instruction more telemathic than another, is a function of two variables in the learner-teacher relationship, which are the extent of dialogue in their communication, and the extent of structure in the teaching programme.

Communication, the sending and receiving of messages, is an essential element of every educational programme, and in non-telemathic teaching

programmes is achieved by speech, together with various supporting non-verbal, but observable, interpersonal interactions. Dialogue is two-way communication. Telemathic teaching requires the use of electronic, print, or mechanical methods of communicating, and these methods differ in the extent to which they permit two-way communication, or dialogue, between learners and teachers. In a programme in which a high degree of dialogue is possible, it can be said that distance is less than one in which little dialogue is possible. For example, in a telemathic teaching programme using the Educational Telephone Network, since dialogue is easy, the learner is less distant from his teacher than one in which the FM/AM radio is the communication method, when dialogue is impossible. Even among programmes using the same communications method there are differences in the degree of dialogue permitted by the programme design, and even ^{among} teachers using the same resource, a particular correspondence course for example, there may be differences in the use of dialogue and thus differences in "distance".

Structure is the extent to which the objectives, implementation procedures, and resources and evaluation design of a teaching programme are prepared, or can be adapted, to meet specific objectives, implementation resources and procedures, and evaluation design of individual learning programmes. While dialogue is a measure of the degree to which the communications medium in a telemathic programme permits learner-teacher interactions, structure is a measure of the extent to which whether there is dialogue or not, the programme will permit individual, personal transactions between learner and teacher. It is a measure of the extent of the responsiveness of a teaching programme to the objectives of an individual learner's programme.

To the extent that a programme "consists of pre-produced parts, at least in the form of particularized plans listing item by item the knowledge and skills to be covered by the programme,"⁽²⁶⁾ the programme may not be responsive to learners' idiosyncracies, and structure is said to be high.

Koffman explains the problem of preparing a less structured programme which attempts to provide many options for the learner,

All questions must be specific by the course author as well as a set of anticipated student responses to each question. If branching is to occur, explicit instructions must be given indicating the performance criteria for a branch and the new continuation point in the programme.

Since everything must be specified in advance, extensive time must be spent in preparing course material for presentation. Furthermore, once programmed, this material has very little flexibility.⁽²⁷⁾

In a highly structured programme, such as a linear, or non-branching programmed text, no variation of the programme is possible, while a correspondence programme is likely to be somewhat less structured, but perhaps more than a computer assisted instructional programme in which the medium permits the teacher to anticipate and prepare responses to thousands of different stimuli from many learners. Among programmes using a particular medium, the degree of structure will vary.

Using the variables of dialogue and structure, telematic teaching programmes can be classified according to distance between learner and teacher.

In Figure 2 where +D represents dialogue, +S structure, -D no dialogue, and -S no structure, the most distant programmes are those of the -D-S type, and the least distant are the +D-S type. These are theoretical poles, and all programmes fall between them. The variables by which we are defining distance are qualitative, and programmes must be regarded as "more" or "less" distant. Therefore, a correspondence programme is likely to be less distant than a programmed text, since it is likely to be less structured, and certainly more

	Type	Programme Types	Examples
Most Distance	-D-S	1. Programmes with no dialogue and no structure	Independent reading study programmes of the "self directed" kind
	-D+S	2. Programmes with no dialogue but with structure	Programmes in which the communication method is radio or television
	+D+S	3. Programmes with dialogue and structured	Typically programmes using the correspondence method
Least Distance	+D-S	4. Programmes with dialogue and no structure	E.g., a Rogerian type of tutorial programme

Fig. 2 - Types of telematic teaching programmes

dialogic. However, among correspondence programmes great variability in distance will be found, some especially being more dialogic than others, and some correspondence programmes can be no more dialogic or unstructured than programmed instruction. Thus, it is not intended to classify communications methods in this model, but only the use to which methods are applied in educational programmes.

In a programme where distance between teacher and learner is low, because dialogue is easy and there is a minimum of structure, both teachers and learners can respond easily to the stimuli of the others. In such a programme the

teaching behaviours Smith calls "admonitory acts" as well as "directive action" and "logical operations" are possible. (28) However, when dialogue is difficult, or impossible, and when structure is high, "admonitory acts" become difficult or impossible. In a programmed text, such as Mager's, a minimum of dialogue between teacher and learner is obtained by use of the branching technique. The admonitory acts, such as "oops! You didn't follow instructions", (29) are weak by contrast to the power such statements would carry in a highly dialogic interaction. In telematic teaching "directive action" is more easily communicated, than admonition, but the teacher must assume that a large part of direction, as well as admonition, will be self administered by the learner. The less distance, the more direction will be feasible. Even the most distant teachers are able to communicate "logical operations". Whether a particular learner will benefit from a programme low in distance, or from a highly telematic programme is determined by the extent to which he benefits or is impaired by direction and admonition. This is determined by his competence as an autonomous, or "self directed" learner.

Graphic Model of Telematic Teaching

The relationship of learners in telematic teaching programmes can be depicted by use of graph theory (Figure 3). In these figures, the influence of A, the teacher, is represented by a ray (—→), an open and general influence, directed at any learners who choose to be influenced. Unbroken lines from learners to the teaching of A represent the learners "hooking on to" the teaching. The broken lines represent the response of the instructor to each learner. In the dialogic teaching programmes there are numerous responses, while in the non-dialogic programmes there is only one. In programmes of less structure there are several rays, representing alternative versions of teaching provided to potential learners, and in programmes of no structure there are no rays emanating from the teacher, but only responses to the stimuli of learners.

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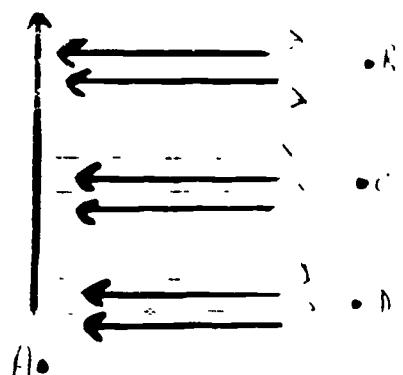


Fig. 3a - Telemathic Teaching Type +D+S (e.g. correspondence programme)

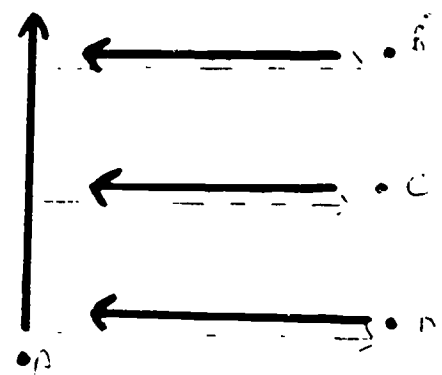


Fig. 3b - Telemathic Teaching Type -D+S (e.g. radio programme)

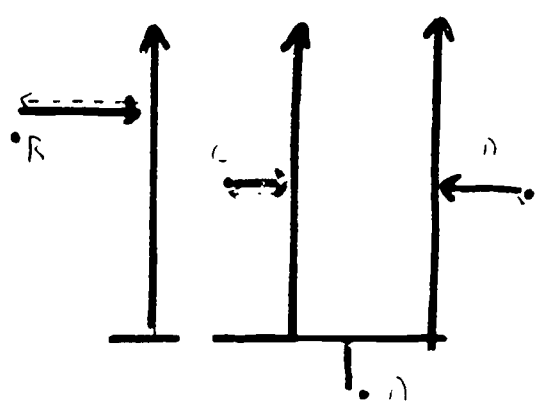


Fig. 3c - Telemathic Teaching Type +S+D but less structured than Fig. 2c (e.g. programmed text)

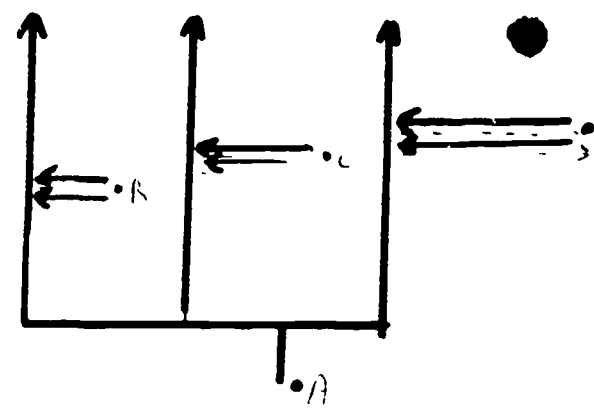


Fig. 3d - Telemathic Teaching Type +S+D but less structured than Fig. 2b (e.g. computer assisted instruction)

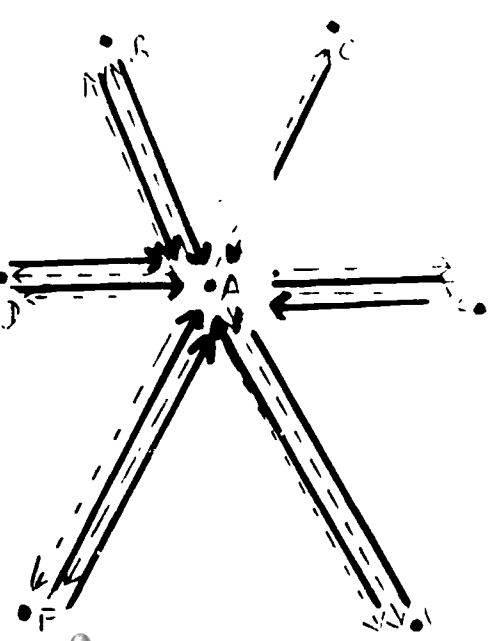


Fig. 3e - Telemathic Teaching Type +D-S (e.g. tutorial)

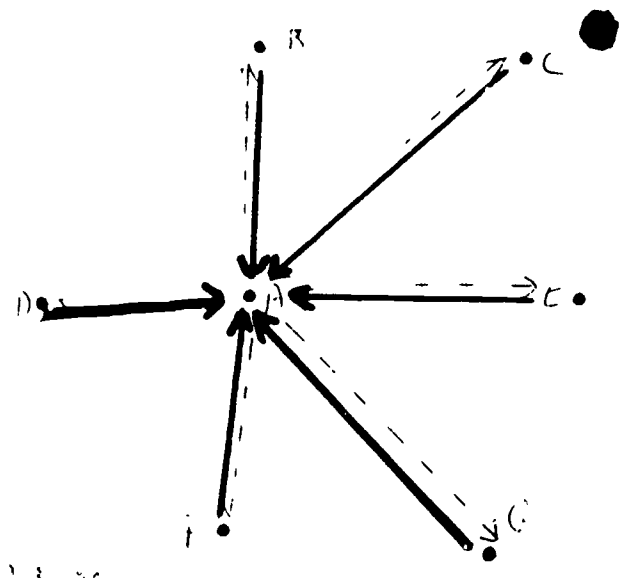


Fig. 3f - Telemathic Teaching Type -D-S (e.g. self directed reading)

The Variable of Learner Autonomy

Definition 6: Autonomy is the extent to which the learner in an educational programme is able to determine the selection of objectives, resources and procedures, and the evaluation design.

In the context of a programme, the term learner autonomy describes the extent to which in the learning-teaching relationship, it is the learner rather than the teacher who determines the goals, the learning procedures and resources, and the evaluation decisions of the learning programme. A fully autonomous learner is a person who identifies a learning need when he finds a problem to be solved, a skill to be acquired, or information he does not have. He is able to articulate his learning need in the form of a general goal, which is differentiated in several more specific objectives, which are accompanied, more or less explicitly, with criteria of achievement. In implementing the learning need, the autonomous learner gathers the information he desires, collects ideas, practises skills, works to resolve his problems, and achieves his goals. In evaluating, the learner judges the appropriateness of newly acquired skills, the adequacy of problem solutions, the quality of ideas, and the knowledge acquired. He reaches conclusions, accepting or rejecting the material, and eventually decides the goals have been achieved, or abandons them. This is obviously the behaviour of a mature adult.

The development in children of perceptions and response patterns having to do with dependence and independence, has been described by Heathers, who defines independence as follows. "A person is independent of others to the extent that he can satisfy his needs without requiring that others respond to him in particular ways".

There are two kinds of independence, called instrumental and emotional. Instrumental independence means conducting activities and coping with problems without seeking help. . . .

The extent to which he persists in the task without asking for help may be taken as a measure of his instrumental independence. (30)

Emotional independence means "the absence of needs for reassurance, affection, or approval in particular situations." It includes "self assertion," in the form of the need to master tasks, which is motivated by the need for self approval on the basis of one's performance. Any behaviour motivated by the need for approval of others is symptomatic of emotional dependence, while behaviour motivated by need for self approval is symptomatic of emotional independence.

Heathers' definitions may be used to explicate the concept of the autonomous learner, who is emotionally independent when pursuing a learning programme, being motivated primarily by the need for self approval. To the extent that any of his behaviours are motivated by need to win approval of his instructor, or other external judge, he is not autonomous. He is also likely to have a high degree of instrumental independence, since he is experienced in coping with learning problems in a self reliant manner, but may be instrumentally dependent at times, for he might ask for help from many resources, and will be able to control and manage various sources of help. However, his approach to a helper is functional, not emotional, so help is used to achieve his learning objectives, not to win the approval of the helper. If he uses distant resources, several perhaps, he may have no personal relationship with a teacher, but if he has a personal teacher, will be able to control the effect and significance of teacher input in a realistic and unemotional way. He will resist teacher direction and admonition, and have a high tolerance for loneliness in learning. This description is very similar to Boyd's definition of the adult learner, a person who

. . . can approach subject matter directly without having an adult in a set of intervening roles between the learner and the subject matter. The adult knows his own standards and expectations. He no longer needs to be told, nor does he require the approval and rewards from persons in authority. (31)

According to Knowles, such autonomous behaviour should be natural for the adult learner who, by definition, has a self concept that he is self directed. Indeed, Knowles writes "the point at which a person becomes an adult, psychologically, is that point at which he perceives himself to be wholly self-directing." Knowles says that dependency is part of the self concept of a child, who begins to see himself as having the capacity to make decisions for himself as his self identity begins to take shape. Unfortunately, however,

. . . as the child moves up the educational ladder he encounters more and more of the responsibility for his learning being taken by the teacher, the curriculum planners, and his parents. The net effect is to freeze him into a self-concept of dependency.

For this reason, adult educators often must help learners to overcome a fear of being self directed and self reliant in learning, for "adults are typically not prepared for self directed learning; they need to go through a process of re-orientation to learning as adults". (32)

Since autonomous behaviour is adult, the very nature of good adult education is the restoration and support of learners' autonomy. In all programmes, this

means "great emphasis is placed on the involvement of the learners in the process of planning their own learning," "the learning-teaching transaction [is] . . . the mutual responsibility of learners and teachers," and there is "a process of self-evaluation in which the teacher devotes his energy to helping the adults get evidence for themselves about the progress they are making toward their educational goals". (33)

Similar positions have been expressed about autonomous learning by Pine and Horne (34), Landvoigt (35), Maslow (36) and Carl Rogers (37), and described in an earlier paper (38).

Classification of Independent Study Programmes by Variable of Learner Autonomy

Since learner autonomy is identified as a major characteristic of independent study, programmes can be classified according to the extent to which the learner can exercise autonomy in learning. To arrive at this classification the following questions are asked:

1. Is the selection of learning objectives in the programme that of the learner, or the teacher?
2. Is the selection and use of resource persons, of books, and other media, the sequence and pace of learning experiences, the decision of the teacher, or the learner?
3. Are the decisions about the method for evaluation and criteria to be used made by the learner or teacher?

By applying these questions a typology of teaching programmes is generated. In Figure 4 programmes range as follows:

1. Autonomous learning programmes in which the learner will use resource persons, literature, and other sources of information and skill, but decides himself what to learn, in what manner, and how to evaluate successful achievement. For example, a homemaker who feels a need to be a better cook, and sets the specific objective to be able to cook three varieties of fruit pies with a success rate of 90%, where success is determined by her family's eating the pies, who chooses to learn by using a "teach yourself" book has made all decisions about her learning herself. Her programme may be described as the AAA type. A teaching programme is used by the learner, but control and direction of the learning programme is in the learner's, not the teacher's, hands.
2. This is a class of programmes of lower autonomy, in which the learner's achievement is judged by an external agent, but the areas of competence in which he offers himself for testing, and the means he employs for achieving competence, are within his own control. In Great Britain,

		Objective Setting	Implemen- tation	Evalu- ation
A - Learner	1	A	A	A
Determined	2	A	A	N
("Autonomous")	3	A	N	A
	4	A	N	N
	5	N	A	A
N = Teacher	6	N	N	A
Determined	7	N	A	N
("Non-autonomous")	8	N	N	N

Fig. 4 - Types of independent study programmes
by variable learner autonomy

since 1885 it has been possible to register oneself as an external student at the University of London (though not for all degrees). Quite independently, the student in the London system may select areas of study, may study as he will, and may present himself for the evaluation of the University examiners.

3. Having freely selected learning objectives, learners may surrender the direction of the use of resources to a teacher. Perhaps this is illustrated in the case of learning sports' skills, where several learners seek out a professional's instruction, but each has different criteria of achievement in mind, and each decides when he has learned enough.
4. A programme type in which the learner, once having defined learning objectives he wishes to achieve, enters a controlled series of learning activities, and is evaluated by his teacher or other external agency. A person who chooses to learn the skills of driving an automobile, and enrolls with a professional instructor, has little control of the instruction, and none of the evaluation.
- 5 & 6. Programme formats, in which the learner controls, in the one case implementation procedures and evaluation, and, in the other, evaluation only.
7. A common type of programme where the student has some control of the implementation procedures, but where the goals are prescribed by his teacher, and he is evaluated by an external agency. The majority of school and college independent study programmes fall into this category.
8. The common type of programme in institutions, especially where professional certification is at stake. The objectives for learning, the means, and the evaluation of achievement, are in the control of the teaching authority.

Discrimination among the various types suggested above is by the variable "learner autonomy", "the extent to which in an independent study programme the learner determines objectives, implementation procedures and resources, and evaluation".

Classification of Independent Study Programmes by Variables of Distance and Learner Autonomy

Independent study describes any educational programme where the learner has autonomy and there is distance between teacher and learner. However, since distance and learner autonomy are both qualitative variables, so is the term independent study descriptive of elements in all educational programmes rather than descriptive of an exclusive class of programmes or methods. By superimposing Figure 2 on Figure 1, we can provide a typology of all educational programmes showing the range from most independent study to least independent study.

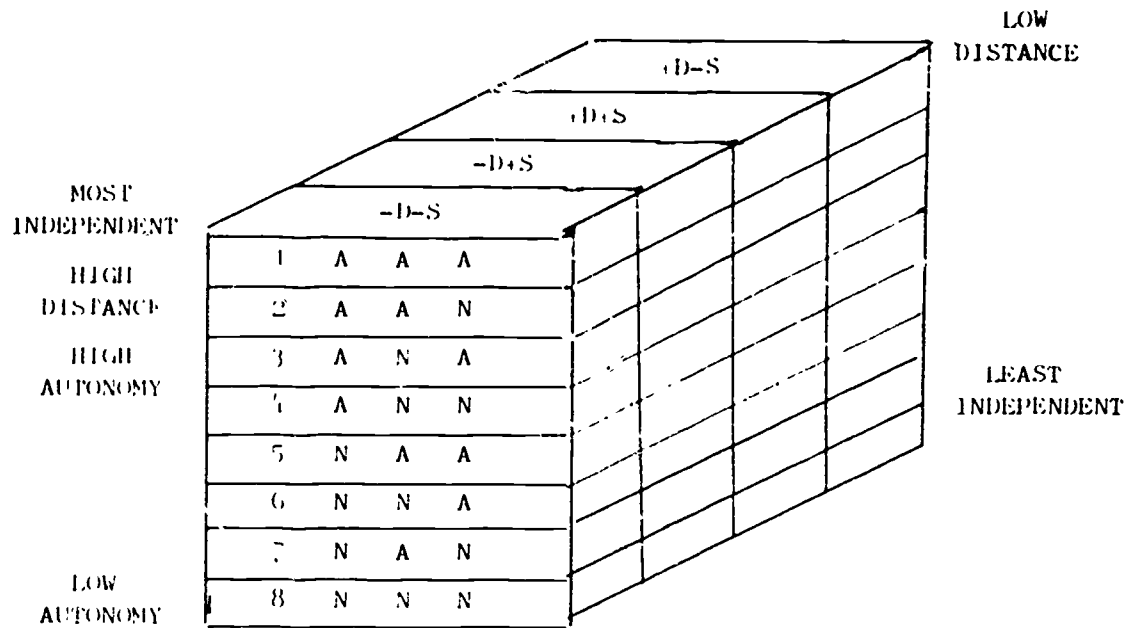


Fig. 5 - Suggested typology of educational programmes

In Figure 5 as in Figure 2, D represents Dialogue and S represents Structure. Programmes range from 1-D-S, which is a programme of high learner autonomy, and very high distance, to 8-D-S, a programme where autonomy and distance are very low, so the learner is largely controlled by the teacher. The former programme is a high independent study programme, the latter is low. Using this typology, we are able to describe any educational programme in terms of its Learner Autonomy, its Telemathy, and its Independent Study.

Part 3: The Theory in Practice

There is some disagreement in education about the nature and about the role of theory. Some educationists have adopted a pragmatic, or functional approach to

the generation and use of theory, and theirs is the position we share. We liken theory to a map, and writing it is a matter of seeking out and describing relationships about different aspects of the topography of the business of teaching and learning. The purpose of such theory is to bring order to the phenomena in which we are interested, for we cannot become scientific in our enquiries, i.e. we cannot proceed to manipulate variables, as long as we are trying to work with masses of assorted facts.

Thus the first stage in any new field consists in constructing a framework for classifying the phenomena in the field. This is not a highly empirical or positivistic concept of theory, as might be appropriate in such better developed sciences as physics, and our theory should not be tested by the criteria of such sciences. Ours has not been an experimental approach to theory building, nor has it been inhibited by concerns about operationism. We have been holistic in our concerns, nomothetic, and molar; positivists will object, in particular to our use of Hypothetical Constructs like "learner autonomy". Our defence is that this theory has been developed as a tool, not an end in itself, and its primary purpose as a tool is to define a field which was previously ignored, certainly in North American educational theory. Its significance therefore is merely as a starting place, as a heuristic device, and if it is then responsible for generating research by suggesting ideas, or even by arousing disbelief and resistance, it will have served its purpose. In this last part of our paper we will describe one major research project which was generated from the theory, and will give some examples of many other questions it suggests.

The research we conducted in Canada and the U.S.A. from 1974 to 1976 investigated the cognitive styles and the attitudes to independent study of students in one programme selected from the High Autonomy/Low Distance sector of the typology, and in another from the High Distance/Low Autonomy sector⁽³⁹⁾. The psychological variable we selected for measurement was that known as "field independence". This was selected because it appeared to represent in one system the personality characteristics which might be expected to predict successful independent learning; it discriminates the person who is likely to define his needs independent of others, maintains his own directions, and prefers self evaluation over evaluation by external standards. Further, field independent persons are said to be task oriented and less affected than others by social stimuli, so might be expected to have a high tolerance for learning at a distance. The second variable to be studied was learners' attitudes to various aspects of independent study, which were measured by means of a semantic differential.

It was conjectured that:

- (1) People who decide to learn through independent study will prove to be of the field independent cognitive style.
- (2) In independent study programmes of high autonomy and high distance, learners will hold different attitudes to more dependent study than they will to independent study.
- (3) Between learners in an independent study programme of high autonomy, and one of high distance, there will be differences in learners' attitudes to independent study.
- (4) Among independent study learners, those with the personality attributes associated with field independence will find autonomous learning and distance teaching more satisfactory than will less field independent. Therefore, the attitudes of field independent learners to independent study will be more positive than the attitude of field dependent learners, i.e., there is a personality X treatment interaction, where the personality characteristic is the cognitive style of field independence, the treatment is independent study methods, and the dependent variable is learner attitude.

To test the conjectures, two programs were selected from the universe of North American independent study programmes, to represent the extremes on our typology of independent study programmes. One, referred to as the Distance programme was the University of Wisconsin's Independent Study Course A42. "Principles of Vocational, Technical and Adult Education" and typical of programmes relatively high in distance. The other, relatively high in learner autonomy, and referred to as the Autonomous programme was the programme for teaching adult education at St. Francis Xavier University in Eastern Canada. Both are programmes for professional education of practicing adult educators. In the latter students have almost complete responsibility for writing their curriculum, using resources, and for self evaluation.

Students are referred to as the Distance students and the Autonomous students. The age, sex and educational distributions of students in the two programmes were similar. The conjectures were stated in the form of hypotheses, the researcher designed an "Independent Study Differential" (I.S.D.) for the measurement of attitudes, and then administered the I.S.D. and Witkin's Embedded Figures Test for the measure of field independence, in person, to each subject in both programmes. Data was analysed by t-tests and regression analysis, and the following is a summary of the findings.

(a) Students in the more Distant form of Independent Study were significantly more field independent than the norm, (.99 level of significance), but the

students in the more Autonomous programme were not.

- (b) Among Distance students there were fewer attitudes in favour of Distance teaching or autonomous learning concepts, but the Autonomous students preferred both over non-telemathic teaching and non-autonomous learning.
- (c) Thus field independence might not be used as a predictor of successful participation in autonomous learning, but might be used as a predictor in distance study. As distance becomes less, a more field dependent cognitive style would seem to be desirable.

Some of the questions which are stimulated by the above research concern the field independence of students in programmes from other sectors of the typology, the field independence of "drop-outs", and the measurement of other cognitive styles. Replication of the study is desirable because there were limitations of a methodological nature in the original which the researcher is well aware of. However, apart from the value of the findings about cognitive style and attitudes of independent students, the research was of some importance, because it was derived from, and in turn contributed to the validity of, the theoretical framework which is the subject of this paper.

Conclusion

What we have presented in this paper has been a summary of the theory of Independent Study and Telemathic, or Distance, teaching. The theory was preceded by a survey of the origin and development of the theory, and was followed by a brief account of one major research project which it has generated.

It was said in our introduction that with the use of the tool of the Independent Study Theory, we could identify "a vast array" of new research and development questions. In conclusion, as a possible contribution to discussion, we will list a few which we believe to be important.

- (1) What is the most effective conceivable system for the production of distance teaching programmes which are truly responsive to the demands of learners?
- (2) What mechanisms are needed to see that learning needs are successfully articulated among individuals and communities for transmission to the distance teaching institution? How can we teach people to be more autonomous where there is need?

- (3) To what extent should Universities provide distance teaching in non-academic fields? (For example, teaching about Parenthood)
- (4) In programmes of high structure, how can we reduce it? In programmes of low dialogue, how can it be increased?
- (5) For which students is it desirable that programmes be of high structure and low dialogue, i.e. Distant; for whom -D-S, i.e. most Distant; and for whom less Distant? Is there a relationship between Distance and Autonomy?

Questions such as these will have to be taken into account as we proceed with rebuilding old institutions and designing new ones. New and changed institutions will certainly be a consequence of the growing confidence with which the values of independent study are now asserted. Adult learning need no longer be random, for through independent study, self directed adults can expect to be served by professional resources in planning and implementing their learning, surely a significant move towards a system of lifelong education and towards the reality of a learning society.

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