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DISTANCE EDUCATION AND LEARNING FOR DIABETES CARE

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I. DISTANCE EDUCATION: DEFINITION AND CONCEPTS :

HOLMBERG¹ defined Distance Education as "the sort of study not led by teachers present in classrooms but supported by tutors and an organization at a distance from the student". For SUMMERFIELD², it comprises "educational activities in which the participants are geographically separated but linked by technology". HARDEN³ has identified as follows, the features of Distance Education : 1) the teacher is separated geographically from the student; 2) the learning programme is carefully planned and the student is provided with advice and assistance; 3) the work done by the student is reviewed by the teacher and remedial work is prescribed when appropriate; and, 5) the learner usually works on his own but small groups of learners are possible.

In its simplest form, mail transmitted papers, Distance Education has existed for more than one century. Students are requested to send back to the Institution personal exercises that are corrected and returned back to them in a narrow time scale. Some "presential" sessions are organized, mostly in "local resources centres" or in "summer school weeks" on a campus, during which professors and students can meet. It is still under this format that it has grown and

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reached a considerable level of activity and quality. The most typical example of paper format Distance Education is probably Germany where almost one hundred Distance Education institutions have been (since they must be) legally recognized. Statutes differ widely from one institution to another. At one end, for instance, the Deutsch Institute Fur Fernstudien is committed to develop research on Distance Education, and to produce educational products, but is not allowed to be a distance education "provider" (or Organizer, delivering certificates). At the other end, the University Of Hagen relies only on distance learning strategy. In between are little institutions (non universities) functioning only by this way and a series of universities using distance education as a parallel means to their usual strategy (presence in lectures) or a partial strategy (i.e. only for some courses).

An example of multimedia expansion is the Open University, since up to these recent years, the most largely used media was paper. The Open University operates for England, Wales & Northern Ireland, from Milton Keynes (a new campus erected for this purpose in 1971 in the centre of England). BBC has played a gigantic role in the OU development and activity, not only by its radio and TV broadcasts, but by its dynamism in eliciting the creation of a computer specially conceived for educational purposes (the famous BBC Acorn computer) as well as, in 1989, the two Domesdaybook interactive videodiscs that describe in multimedia format and by billions of pieces of information, the "State of England", just as the original Domesday Book, ordered by William the Conqueror in 1089, described England of this period... on paper. The

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Open University demonstrated huge amounts of creativity in developing special experimental resources (packaged seeds, experimental hardware such as miniaturized kit microscopes) to enable its distance students to learn independently.

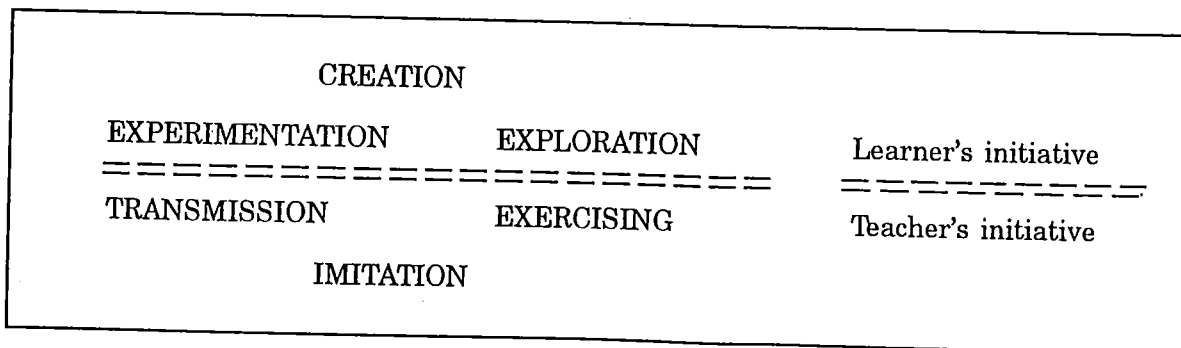
Nevertheless, the majority of distance learning institutions use, currently, a **non-integrated multimedia strategy** (paper, TV, Email, etc.). This means that media are used "side by side", or one after the other. For instance, some professors of the University of Liège, provide TV recording of their lectures, in addition to their "syllabus" so that their students have not to "attend" the course in the classical sense. Students are nevertheless requested to send their questions and reactions by fax and by Email, and the staffs responses are fed back to them by the same channels. This constitutes a "virtual classroom" with its own advantages and drawbacks. A project called TELEDU will offer "visited professors" from three other universities to students of the University of Liège. Conversely to "visited professors", who travel to the visited university, these "visited" professors remain in their own university from which they can interact through videoconferencing.

Fully integrated multimedia distance learning is now available by the way of Internet, the World Wide Web, through which each (equipped) person can access through millions of data bases located in all parts of the world, some having their access restricted to selected registered member or charging the users on the basis of connection time or of transmitted data. Besides the world reachability of servers a series of gateway of different natures restrict the have access to information. The integration of multimedia is encapsulated in the fact that users can access, by the same device [(a distant server, a CD rom) to data in formats as different as full video motion, animation, sound (including self recorded, texts, computations, interactive facilities)].

II. LEARNING\TEACHING STRATEGIES

1. The six Learning/Teaching paradigms

DENTS & LECLERCQ (4) have identified six "paradigms or couples" of learning and "teaching" processes that can be grouped according to the origin of the initiative (whether the exchange is teacher-initiated or learner-initiated) :



In the three paradigms below the horizontal line, the teacher has the initiative. In the three upper ones, where the learner has the initiative "rests on the assumption that the learner is an active partner"⁵.

In every day life, much is learned by **IMITATION**, resulting from immersion in social contexts. Models may even not be more conscious

of "modelling" others' behaviours than the latters of being copied (technically) and identifying (symbolically) in this mostly latent process. We learn also day after day from intentional communication, in an information **TRANSMISSION** process. Televisions, books and now NITS have already overpassed the average teacher's capacity in this function, ...in such a

way that, to quote FOURASTIER, "Technology forces humans to specialize in humanity". On some domains, we need systematic EXERCISING, i.e. practicing with guidance, coaching and correction. The programmed learning movement deals with this paradigm. Other domains benefit from a more free EXPLORATING approach, such in the free visit of a town (in opposition to a guided tour) where the learner has the initiative, wanders at will, raises the questions to the expert, etc. Hypermedia are the modern version of this paradigm. In other cases, there is a need of systematic EXPERIMENTATION, i.e. to combine several possible modalities of a context in order to see what the effects are. The initiative of the learner lies in the conception of the hypothesis. In a last paradigm, the learner is

engaged in a CREATION process, i.e. builds an object, an event, a product to achieve his/her project (or a collective one). The learner is creative not only on the content side but also on the process one.

2. The five facets of each paradigm

For each paradigm the 5 following facets should be considered :

1. The educational setting
2. The teaching/learning process (type of interaction)
3. The learner's point of view.
4. The teacher's main role (what he/she provides)
5. Typical places where it happens.

1. Discovery
2. CREATION
3. "Let me build my project"
4. (Building elements)
5. Music studio

1. Trials and errors
2. EXPERIMENTATION
3. "Let me combine"
4. (Manipulation tool)
5. Laboratory

1. Questioning
2. EXPLORATION
3. "Let me wander"
4. (Browsable data)
5. Museum, library

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1. Teaching
 2. TRANSMISSION
 3. "Tell me"
 4. (Manipulation tool)
 5. Laboratory

1. practice
2. EXERCISING
3. "Correct me"
4. (Feedbacks)
5. Stadium

1. Immersion
2. Imitation
3. "Show me"
4. (Models)
5. Street, TV

The 6 paradigms are opposed in couples, according to three directions (axes). In addition, human learners often demonstrate **mathetical ambivalence and polyvalence** ("mathetics" comes from the greek root "manthano" that means "to learn"). That means that when a learner has several possibilities at hand, he/she often uses them all, at will ("let me explore or try" and, a few second afterwards "tell me" or "correct me"), according to his/her estimated needs or his/her **mathetical competencies**, i.e.

- knowledge of his/her momentary readiness, mastery of prerequisites,
- momentary interest for a question, elicited by encounter of unexpected stimuli,
- degree of vigilance, fatigue, need of media variety,
- the estimation of the optimal degree of task difficulty,
- consciousness of cognitive equilibrium disruptions and need for reequilibration.

The "autonomous person in learning" is often called "autodidactician", that means "be a teacher for oneself". This wording problem could be looked upside-down : considering that learning is a spontaneous process and that teaching is a prosthetic approach, teachers could be called "learnhelpers".

3. Educational strategies

The teacher-trainer has to conceive his Method Mix just as advertisers have to prepare a Media-Mix) that will optimize the acquisition process and/or motivational changes. Moreover, the learner's mathetical ambivalence forces him/her to demonstrate **didactical polyvalence**. Since the learner can ask "Tell me" and, a few seconds afterwards "Let me explore", the trainer has to be skilled in all those functions : be a good designer, a good transmitter, a good coach, a good model, a good environment provider, a good evaluator, a good stimulator, etc.. Obviously, it is less and less possible to meet all those possibilities in a given single person, and technology is taking an increasing place in the training strategies, leading to **SERVUCTION** (a word coined by economists of the University of Lyon), i.e. the principle of having the learner-consumer participate more and more in the delivery of the goods or of the service, just as it happens in self-thinking and in self service in general.

Actual settings combine several paradigms : Traditional lessons combine mostly transmission, exercising and imitation. The Project Based Approach represents almost the opposite combination. Lab work, dialogs, Problem Based Learning, etc... offer other kinds of "patchwork". This can be represented as follows :

	LESSON SEMINAR	PROJECT APPROACH	LABORATORY	PROBLEM BASED LEARNING	DIALOG
IMITATION	X		X		
TRANSMISSION	X		X	X	X
EXERCISING	X				
EXPLORATION		X	X	X	X
EXPERIMENTATION		X	X		
CREATION		X		X	

III. DISTANCE EDUCATION AND DIABETES

Education of the patient is presently recognized as a major component of diabetes management. Teaching / learning options in diabetes care include :

1) **Individual face-to-face education** : its value has been recognized for several decades; it involves the physician, the "teaching nurse", the "diabetes educator", the dietician etc.; it is a mandatory component in all teaching strategies.

2) **Group teaching** : it can be done in the form of lessons, lectures, seminars, practice sessions sometimes groups in a "teaching week or week end".

3) **Patients' Associations activities** : at the local, national, regional or international levels, the patients' associations have long recognized the need for education.

4) **Slides, movies, videos** : are useful adjuncts to the teaching programmes.

5) **Computer-assisted instruction** : a few programmes have been developed ; a pioneer initiative has been the DOCEO system developed at the University of Liège⁶ and now used as "DAVID" in close to 200 hospitals and clinics in France, Belgium and Switzerland (at the time of writing, the system has only been developed in French).

6) **Distance teaching/learning** : Uptil now, distance education (in the sense developed above) has been little used in the field of diabetes. A search in the ERIC database 1980-1995, revealed 294 entries for "distance education", 283 for "diabetes" and none for both. On Medline 1991-1995, there were 7615 entries for "diabetes", 6180 for "patient education", 284 for "distance education" but only 1 for "distance education in diabetes"⁷.

The pattern is likely to change rapidly. FALLUCCA et al⁸ most recently reported their experience of "tell medicine in the treatment of diabetic pregnancy" which included a teaching

component in the distance management of 7 women who performed intensive self-monitoring of blood glucose during their pregnancy. TURNIN et al⁹ reported the success in nutritional education of "Nutri-expert" a telematic system for diet self-monitoring. In a paper entitled "Using telecommunication technology to manage children with diabetes", MARRERO et al⁷ described "The Computer-Linked Outpatient Clinic (CLOC) study." Its purpose is "to evaluate the efficacy of using a telecommunication system to assist in the outpatient management of pediatric patients with insulin-dependent diabetes. : 106 pediatric patients (mean age = 13.3 years) were randomly assigned to an experimental or control outpatient clinic for 1 year. Experimental subjects transmitted self-monitoring blood glucose data by modem to the hospital every 2 weeks. Transmitted data were reviewed by nurse practitioners who telephoned subjects to discuss regimen and adjustments. Control subjects received standard care with regimen adjustments made by physicians. There were no significant between- group differences for metabolic control, rates of hospitalization or emergency-room visits, psychological status, general family functioning, quality of life, or patient-child responsibility. A significant decrease was noted in nursing time-on-task for experimental subjects".

Taking advantage of the revolutionary changes acquired from the incorporation of intelligent systems in diabetes research, the European Association for the Study of Diabetes (EASD) has created a Study Group entitled DOIT (Diabetes Optimisation by Information Technology) to promote a network of scientists to co-operate in this area. Many members of this EASD Study Group are actually engaged in interdisciplinary European teams working together in several EC Telematic Projects (e.g. Diabcare Quality Network, DiabCard, T-IDDM, etc.), all directed toward the design of integrated systems which benefit diabetic patients through their direct participation in their own treatment; information collected from various sources will

help in clinical decisions to improve quality of care, to assist in epidemiological research and in professional and patient health education¹⁰.

IV. CONCLUSIONS

The three components of our title (i.e. Distance Education; Learning; Diabetes Care) are likely to establish more and more connections in the very near future. No doubt that the media technology consortia will be pushing, whereas diabetic patients and health professionals will probably be pulling. Emphasis has been put to teaming in this paper in order to stress the necessity to carefully plan and combine the distance education strategies in terms of refined teaching / learning paradigms.

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