Cooperative Education: Andragogy

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ABSTRACT

According to the Report Jacques Delors, education in the 21st century will be supported over four pillars. It is expected for the students: to learn how to acquire knowledge, to learn how to realize, to learn how to socialize and to learn how to be. The learning of how to acquire knowledge has been the main objective of the conventional education and in a minor fashion, the learning of how to realize. Thus the learning of how to socialize and how to be and also the learning of how to deal with behavioral matters requires new educational models. Cooperative Education is an education model that presents an alternation of Academic Periods at the university and Work Term Periods (Internship programs) in corporations. The reason for the use of this new model at the university, Andragogy, from the Greek words *Andros Agein Logos* which mean, respectively, *man conduct science* is based on a principle that many problems originated in higher education result from not considering the age of the group of students which is above the one to whom the pedagogy appropriated for children is applied (from the Greek: *paidós* which means child, *agein*, to conduct *logos*, science).

Keywords: Andragogy, Cooperative Education, Work Term, Engineering Education.

At the end of the 20th century, a UNESCO commission issued a report on the new routes of Education in the 21st century due to the promptness of the communication means at availing an immense amount of information, thus imposing deep changes in the teaching methodology. The Jacques Delors Report concludes that education should be organized on four pillars upon which the students may:

1. Learn how to know-acquire tools for understanding;
2. Learn how to do – to be able to act on their environment;
3. Learn how to be sociable– to socialize and develop cooperative activities;
4. Learn how to be – to aggregate the the three previously mentioned aspects: to know, to do and to socialize.

In the conventional teaching one learns how to know and, in a lesser scale one learns how to do. The other two learnings are not taken into consideration and comprise behavioral problems which require new teaching methodologies.

Educators such as Malcolm Knowles and Pierre Furter, among others, associate the term andragogy with adult education. The reason for the use of this new model in higher education, Andragogy, from the Greek words *Andros Agein Logos* which mean, respectively, *man conduct science* is based on a principle that many problems originated in higher education result from not considering the age of the group of the students which is above the one to whom the pedagogy appropriated for children is applied (from the Greek : *paidós* which means child, *agein*, to conduct *logos*, science).

According to Knowles (1980) andragogy takes four hypotheses for granted and that the adults' behavior as learners, differs from the children's as pedagogy's object. These four hypotheses consider that the learners: (a) change their self concept as they acquire experience and become independent and self guided; (b) acquire, through learning,

more knowledge and consequently more resources for a self learning; (c) get more motivated through learning as they try to perform their social roles; (d) become more pragmatic as to the use of their knowledge, being more interested in its immediate practicity centered on problem solving.

According to Gibb (1967) adults' learning happens based on six principles: (1) learning should be centered on problems; (2) learning should be developed through the learners' experience; (3) experience should be meaningful to the student; (4) the student should feel free to analyse the experience; (5) the aims and research should be set and carried out by the student; (6) the learners should receive a *feedback* on their progress as to the aims.

Table 1 presents a comparison between pedagogy and andragogy.

Table 1-Pedagogy X Andragogy (Knowles apud Cavalcanti, 2005)

PREMISES	MODEL	
	PEDAGOGICAL	**ANDRAGOGICAL**
Need to Know	Children learn without questioning and not knowing the use of what the teacher teaches.	The adults know their needs and, in a pragmatic way pursue knowledge according to their needs.
The Learner's Self Concept	The learners depend on the teacher. The system affects their self esteem and depresses them as their skills are put in doubt.	The adults act independently, with autonomy and they feel able to learn and acquire knowledge they need even without the teacher's help.
The Learner's Role	The learner's experience is not valued but the teacher's and other scholars is.The learners are suposed to read, listen to, do the schoolwork and homework.	The adult learners' experience is of paramount importance. The teacher's and other scholars' experience only serve as a reference source which may or may not be valued by the student.
Readiness to Learn	The learners are always ready to learn whatever the teacher wants them to in order to pass the exams.	The adult learners are ready to learn whatever they want to learn that is meaningful to their needs.
Learning Guidance	The learners are oriented to learn subjects with specific contents which are deemed necessary in the future, according to the teacher's view. Learning is organized according to the program contents logics.	The adult learners aim their learning towards what is meaningful in their lives-for immediate use not future use. The content does not need to be organized according to the program logics.
Motivation	Learners are motivated to learn by external incentives such as grades, passing an examination, failing in examinations, the parents' demands and others.	The adults' motivation lies on their tendency to update their knowledge, an inner motivation, their own wish to grow, their self esteem, and fulfillment.

According to Cole (1981) learning in action leads to the interest in the development of professional identity through exploration of skills and the discovery of vocations while carrying out practical activities (table 2).

Table 2 – Skills and vocations

To know/ To learn	EXPLORE ABILITIES AND REVEAL VOCATIONS
Their interests	To give the learners the opportunity to know and try different work areas in order to uncover their interests and abilities.
To be	To allow the learners to immediately learn the demands of some jobs and their possibilities of fulfilling them by carrying out practical activities.
To socialize	To show the learners what is expected from them as to some kinds of activities, their daily duties, people with whom they have to socialize and the level of competition expected from them.

The learning process through the andragogical methodology assumes that the learners should pursue knowledge related to what they practice, gaining experience as they sort out real problems. They should receive, however, orientation as they progress in their learning. These new methodologies create new teaching paradigms as seen on table 3 (SEBRAE, apud Matai, 2008).

The aim of teaching is to develop personal abilities and not only the curriculum concepts. The term competence is defined by Perrenoud (1999) *as the ability to act efficiently in a certain situation based on knowledge but not limited to it*. In this context scientific knowledge is used to build abilities and is not restricted to reflection but to the development of abilities built through practical action.

Learning through practical action can be described as a process through which learners think their experience over causing *insights* or a new learning. It can be defined as a process beginning with experience followed by reflection, discussion, analysis and evaluation of experience. Seldom, though, one learns from experience unless one evaluates it, draw its own meaning from it in terms of

one's own aims, purposes, ambitions and expectations. From these processes *insights* are generated as well as discoveries and understanding. The parts take their places and experience gains a meaning and form and adds to other experiences. The process is judged, synthethized and integrated to the learners' construction system. The learners impose it to the world through which they see, perceive cathegorize, evaluate and search experience.

Table 3 - Comparison between the traditional view and the new teaching paradigm.

TRADITIONAL VIEW	NEW PARADIGM
VALUES/PERCEPTIONS: a mechanicist and fragmented view of knowledge	VALUES/PERCEPTIONS: systemic view of knowledge
TEACHING: action of knowledge transmission managed by the instructor	EDUCATION: emphasizes how to learn to know, to learn to do, to learn to be and to learn to socialize.
INSTRUCTOR: focus of the teaching process	EDUCATORS: they are the stimulators of a plural and multidimensional environment.
LEARNER: a passive element in the learning process.	LEARNERS: the reference centers of educational action, they are the agents and authors of the learning process.
CLASSROOM: the physical space for teaching.	LEARNING ENVIRONMENT: is not limited to a physical space but to the learning concept.
CONTENT: pre-determined with isolated subjects or fragmented themes.	CONTENTS: an integrated process of a meaningful construction of knowledge, interdisciplinarity.
AIMS: behavioral and the teacher has control over the content being taught.	LEARNING AIMS: development of knowledge, skills and apropriate attitudes to reach an aim.
MEANS: they have teaching purposes.	MEANS: they develop sofisticated forms of multidimensional and sensorial communication which help students learn.
RESULTS: the reach of aims can be scored.	RESULTS: evidence of ability reach in learning to know, learning to do, learning to be and to socialize.

Educators such as Dewey, Lewin and Piaget, consider learning a tension and conflict process which happens through interaction between learners and their environment involving concrete experiences, observation and reflection which generate a permanent review of learned concepts. Learning is a process not a state. The idea of the learning cycle was defined by several researchers but the origin of the cycle is frequentemently ascribed to John Dewey (2000). The most important concept in his study on learning is the notion of experience. The author defines learning as a continuous reorganization and reconstruction of experience which happens all the time and in all situations in which people act and interact, reflect and think. According to Dewey, learning comes from a situation in which the learners are confused or in doubt or facing a problem that makes them stop and think generating a flow: situation-problem-questioning-reflection-new situation.

If there is no interest there will not be any learning. Much of what is taught to the individual may be forgotten. Not by stupidity, but by intelligence. The body cannot carry the weight of a dead knowledge that cannot be associated with life (Alves apud MATAI, 2004)

Learning is associated with the individuals' own motivation that leads to the conscience that it has to participate in the activities. The exercise in the activities of the profession allows the individual to explore skills and to discover vocations within the political aspects of organizational life, since working in any area of knowledge involves not only the use of logic and reasoning, but also issues concerning interpersonal relationships. As the individual is introduced into the work market it is leaded to reflect on its own skills (Intrapersonal intelligence). Its evolution begins when skills and values are tested in the midst of the tribulations of life practice. When there is identification with the professional activities the individual is induced to empowerment and acts towards the search for knowledge.

COOPERATIVE EDUCATION

According to CAFCE[1] – Canadian Association for Cooperative Education, Cooperative Education is a teaching model which develops systemic learning through lessons and learning based on work. This model integrates businesses and school in the training of skilled professionals able to face the dynamism of the work market which demands a quick adjustment to function and updated knowledge kept up with technological innovations. The program consists of alternating periods of experience in appropriated fields of business, industries, government organs,

[1] www.cafce.ca

social services organs and companies complying with the following criteria:

- Each training program is developed and/or approved by the cooperative educational institution according to their pedagogical project.
- The cooperative course learner is engaged in the productive work instead of being a mere observer.
- The cooperative course learners are paid for their work done.
- The cooperative course learners' progress at work is supervised by the cooperative teaching institution.
- The trainees' performance at work is supervised and evaluated by the company which accepts the cooperative course learners.
- The work experience period in companies should be at least 50% of the time spent at academic activities at school.

Cooperative Four Month Structure

The pattern of the four month period course described here suggests that the school year be reorganized with the introduction of a third school term in the year with the purpose of enhancing the institution's resources.

The training six modules allow the learners to experiment with several functions in different action areas of the job exploring abilities and uncovering vocations besides adding a two year professional curriculum to the diploma. To clarify this, table 4 compares an example of a traditional semester model to the cooperative four month period model.

Table 4. Semester and four month period structure patterns (MATAI, 2007).

Semester – Traditional												
Year	J	F	M	A	M	J	J	A	S	O	N	D
1º			**Class**1					**Class**2				
2º			**Class**3					**Class**4				
3º			**Class**5					**Class**6				
4º			**Class**7					**Class**8				
5º			**Training**					**Class**9				
Rooms			4					**5**				
Vacancies			1					-				

Four month period – Cooperative												
Year	J	F	M	A	M	J	J	A	S	O	N	D
1º	**Class**1				**Class**2				**Training**1			
2º	**Class**3				**Training**2				**Class**4			
3º	**Training**3				**Class**5				**Training**4			
4º	**Class**6				**Training**5				**Class**7			
5º	**Training**6				**Class**8				**Class**9			
Rooms	**3**				**3**				**3**			
Vacancies	2				2				2			

In the semester structure made up of 9 class modules at school and a full time training period 5 classrooms are needed all over the year and a set of vacancies for the training.

In the four month period structure three classrooms and two sets of vacancies are needed for the training. In this example one sees a 40% reduction (fourty percent) of the number of classrooms which, besides enhancing the physical space, equipment and other resources it improves the teacher per number of learners' ratio.

It is an efficient answer to meet the demand for well trained and efficient professionals to meet the aims, vocations and abilities of each student. The full time training activities enable the student to perform anywhere in the country and overseas pursuing the best programs for professional training through curricular trainings as a teaching complement.

The Cooperative Teaching model includes follow-up through seminars and visits of the guiding teacher to the learners' workplace. For bigger structures, a group of training coordinators visits the students in the companies and guide them in the career development.

At the same time these training coordinators make prospections for the opening of new training vacancies, they make and forward the students' and companies' evaluation to the school, thus generating information which will enable them to plan corrective actions in the program content of the courses preparing the majoring students for a constantly changing work market.

Annual events of confraternization between school and the companies' directors are programmed to divulge the competences offered by the teaching institution with exchange of information and consolidation for other partnerships as well.

This kind of Cooperative Teaching develops university-business interaction and motivates the students to a strong upbringing, clearniness in the

career conduction, it emphasizes employability, vocational maturity and gives the employers flexibility in the work force, recruiting and keeping trained workers.

Competences

Development of competences involves a change in structure and meaning of work practices. In this sense a fundamental aspect refers to use of knowledge in work situations (know how to act). Knowledge is built and, at the same time incorporated to attitudes and it appears in actions and work practices.

An analysis of competences with the use of VECA method (MATAI, 2007) among students of cooperative courses at EPUSP (MATAI, 2004) evidenced that the activities of curricular trainings develop personal competence potentials demanded by the work market. In another study using the *Siewert* method on the competences which would define"what makes" a good teacher from the learners' viewpoint, it was concluded that the students seem to consider the didactical, pedagogical or technical qualities fundamental but they attiribute a major importance to such qualities as leadership, participation, interest in the students and knowledge of the subject being taught, which indicates that it is not only the students who should develop competences but the teachers should also master their job.

History

The first known register of Cooperative Education is in the *British Sandwich Program* which was developed at *Sunderland Technical College*[2] in 1903, in the course of Naval Engineering and Architecture. The course consisted of an integration of the academic teaching with training at the naval industry. The course demanded a considerable long training period in industries: about 18 months for 4 year graduation programs and 12 months for 3 year graduation programs.

***Co-op* Education in the United States**

In the United States, Cooperative Education began in 1906 at Cincinnati University[3] in the Engineering courses. The visionary Professor Herman Schneider thought as follows: *many elements in most jobs cannot be successfully taught in classroom but require practical experience for the appropriate command. Most of the students needed or wished to work during studies but the available kind of work at the time had poor characteristics and had no relationship with the study program.* At that time he signed conventions with 13 local employers to admit 27 students in a program which alternated work periods.

The students acquire professional skills, through trainings during Cooperative Teaching, and when they major, they become more competitive.

***Co-op* Education in Canada.**

Cooperative education was introduced in Canada in 1957, when the Waterloo University[4] began its first "*Co-op*" program in Engineering courses. It grew slowly in the beginning but after 1970 it rapidly expanded to other universities in the country. In 1989, an impressive number of students registered in "*Co-op"* programs in more than 115 universities in Canada**.**

***Co-op* Education in Brazil.**

Escola Politécnica – University of São Paulo (EPUSP)[5] represented by their Professors Osvaldo Fadigas Fontes Torres and Décio Leal de Zagottis implemented a Cooperative Course in 1989 following the model of the Waterloo University in Canada. Production, Chemical and Computer Sciences Engineering Courses were offered as a choice for the exact sciences entrance examination. In the 1999 curricular reform, the Cooperative courses were adapted to the EPUSP new structures: they were offered in the four month period structure as a choice in the major areas of Chemical and Computational Engineering only after the second year at school.

Universidade Federal de Santa Catarina[6] started their Cooperative Education project in 2001 by offering the course of Materials Engineering in the four month period structure during the whole course.

VIEW OF THE FUTURE

Conventional teaching has a century old structure of which the philosophy is based on reaching aims. This teaching model is based on the principle that each student, in order to reach an aim, should acquire knowledge or learn a skill. It is

[2] http://www.sunderland.ac.uk/university/history/
[3] www.eng.uc.edu/welcome/history/
[4] www.uwaterloo.ca
[5] www.poli.usp.br/coop
[6] www.materiais.ufsc.br

presumed that there is the possibility of specifying all the necessary material so that the students can associate the effort demanded from them to a clear statement. In this context, the process induces the students to expect and the teacher to strongly stress what should be learned. This teaching model implies mainly the fact that it is appropriate to be driven to answers since this is how the students are evaluated in order to asses if they have reached the learning aim. To give the right answer as a result of manipulation of instruments, data or ideas according to what was taught to them is the best indicator of a successful learning. In this educational system, conditioning leads to the ability to perform in the present which in a short time will be or has already become past. The training of professionals for a technically constantly changing globalized market requires a teaching methodology that promotes a symbiosis with this process of changes and, above all allows the students to try their their skills, aims and values efficiently for the development of their professional identity. This will take longer if their experience is poor or developed later in their professional lives. Talent without motivation leads gradually to atrophiation. Inversely, new challenges can bring to surface latent talents which were not revealed. The new methodology should adjust people to different kinds of life and choices of work linked to their natural abilities and existing in their culture: an adjustment which will become a source of self fulfillment and of contribution for social welfare.

A modern educational system aims mainly at giving the students the responsibility to pursue their own education and it will be developed in such a way that these students will overcome the idea that education only happens at school. It should also consider that it is no longer possible to make the students learn in the present everything they are suposed to learn neither is it possible to believe that one can learn everything. This ideal is no longer possible. Much of what has to be learned to the end of the course has not been discovered or invented and in a few years part of what the students have larned will become obsolete. In this scenario training becomes a process and no longer a state.

The increase of the number of students' adimitances through cooperative education, propose an effective and dynamic, with suitable teaching model, and a learning model through efficient, modern and simultaneous methods without an artificial and protected environment but one intertwined with work and life.

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