
DESIGN OF TEACHING ELEMENTS FOR DEVELOPING AND STRUCTURING THE INNOVATION CAPACITY

Dan Milici^{*}, Mariana Milici and Dorel Cernomazu

'Stefan cel Mare' University, 13 University Str., 720229, Suceava, Romania

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Abstract

The idea of new and beauty utility is created in the brain, or the sensitivity of a certain brain is able, at a chosen or well stimulated time, to extract the novelty from an universal database. The paper shows elements that must be contained in the educational activities in order to develop the innovation capacity. It also considers what happens at the concrete level of transformations produced by the new information and communication technologies.

Keywords: teaching, innovation, information, knowledge, creativity

1. Introduction

A prospering economy is based on creative work, which puts added value to the physical or mental work. In today's society the physical *labour*, the toil, is paid increasingly less, while the creative products become value. Knowledge Society is a society in which man evolves consciously through creativity and innovativeness, abilities so oriented to allow with priority the Human development and not the simple use of the Nature.

The problem of training young people in the context of a dynamic and unpredictable process of the current socio-economic development is a global problem, not a local one. Reconsidering the concept of education, reformulation the requirements for an adequate educational system to the new context, are concerns of the worldwide academia. We are searching for solutions, we are systematizing and filtering useful information, all things flow and turn. Essential is to not look fiercely at these changes, from the narrow perspective of a profession, subject matters, personal goal. Do not forget that life is not Mathematics, Literature, History, Biology, Physics, Computer science, sports, ... life is coherent and those listed above are areas of human interest in his attempt to explain it in some respects. The fact that young people are not attracted to learn in the way we want doesn't mean they don't learn. The society must be

^{*} E-mail: dam@eed.usv.ro

able to motivate and attract the young people to the area where they are mostly needed. It does matter if what we offer to the learners and how we do it have a resonance with the today's world. The value was and will always be the human mind, the creativity, the ingenuity, and not the production, the trade, the advertising, the judicial...

Each time we speak about creativity we give definitions of perfection, but we forget that we have in front of us a learner with flaws and qualities, with weaknesses and exceptional availabilities, often undiscovered yet. We must highlight the limitations and the characteristics of the time we live.

What should do a lecturer? What are the qualities of a lecturer? The lecturer is both actor and director. He plays a role because he performs for the learners and, by what he does and says he transmits information. The role is adaptive (it must be played in such a way that to capture those in front) and interactive (because the *stage* partners are the learners with whom he must collaborate, dialogize); learners should be always challenged and their reaction should be always evaluated. At the same time the lecturer is director because he puts on stage the lesson, initiates conversations, rapidly changes scenarios, based on his own experiences and personal vision of the world and life.

Although the human nature is so diverse, the lecturer should play his role so that to give the illusion that everybody gets what wants, to transmit optimally the information not boring and tiring and to keep the learners' interest.

It's actually a paradox: on the one hand he must play a role, on the other hand he must be genuine. To be, at the same time, himself and another one, to correspond to the ideal lecturer wanted by the learners and, eventually, by their parents, but to be also the man who lives in this world and who knows what man faces in contemporary society.

The educational ideal has indicative value and descriptive generality for everything is done for the man training and his education. Depending on the degree of generality the objectives are [1]:

- Framework objectives and reference objectives - are objectives with a high degree of generality and complexity and are tracked over several years of study. Can be identified within the entire educational system (giving direct expression to the educational ideal), depending on school type and profile, according to the education level (primary, secondary, etc.), depending on the dimensions of personality formation (moral, aesthetic, etc.).
- Operational objectives, concrete - are provided in the curriculum on subjects (of teaching/learning Mathematics, Music, etc.) and for lessons systems, are determined by the lecturer for each lesson. They are an expression of anticipation by the lecturer of some behaviours of the learners, observable and measurable in a short time (during a lesson).

Increasing the capacity of processing information can be considered as a deep property of the Universe in which we live. This observation can be extended to the level of the artefact evolution. Itself the act of processing seems to be the cause able to change both the context and the substrate, thereby contributing to the accelerating and developing of the perception and of the

relation with the environment. Thus, the continuous increase of the processing capacity appears to us as being an universal process, independent of the material and unlimited in time. The society performance at a time is the result of a complex process of interactions between individuals, themselves being systems that continuously transform by cumulating history. A spectacular self-organizing process, difficult to understand and studied through the current paradigm limited by a linear approach, still tributary to an emphasized residual reductionism, is a reason why Sociology, Economics or Political science are in the same class of difficulty on understanding the living and life, being closer to Art than Science as defined in the classical sense. Although they are talking about a socio-economic restructuring and about the need to improve the quality of life and human performance in general, in concrete terms the steps are still timid, due to the missing of critical mass of those who are aware of the conceptual limits of the current paradigm and who can coherently operate with the series of consequences arising from the new paradigm of Knowledge.

2. Problematization

We evolve discontinuously, structuring societies which gradually *detach* us from the Nature. Each stage of development had a series of features and implicitly prepared each 'cell' of the social body just to stabilize it in the mission it had at that stage of development. The whole is more functional than any part. The current difficulty is given by the acceleration of *metamorphosis* process of the 'social body', that passes increasingly faster to the Society of Information, of Knowledge, of Conscience, but our mentality still remained in a society where the general vision was oriented to the material, to the product and to the production, in which every piece must be designed to be easily replaced, in which the value and hierarchization is done by efficiency and quantity. Human value in this society is reduced to 'resource', Man is a tool breeding procedures and should know just enough to be able to face the job, and the school should create only replacement individuals for an economical mechanism increasingly more productive, to quickly prepare a replacement which should not understand or try to understand, but should just know how to apply, to react, not to act in any way. The school was so focused on *knowledge* transfer and not on training Knowledge, the ability to dynamically refine a notion, a concept. These seemed unnecessary, so not socially rewarded. In this context the 'gold bracelet' is not just a job, but the Creativity and the Innovation, the capacity to assimilate, to problematize, to bring something new, to think and create [F. Munteanu, *Despre complexitate și viață (About complexity and life)*, www.complexity.ro].

Due to the business globalization, results many challenges. Raising barriers between countries as well as because the advanced technological information facilitates the business development across the globe. The borders become increasingly insignificant and the global competition intensifies. International expansion has led to the expansion and increasing complexity of corporations. Businesses today, more than ever, are situated in different areas

and have as employers workers from various cultural areas with different educational levels. Thus, more information is needed in organizations, internal plans, logistics and distribution. Corporations worldwide are now looking for more efficient and innovative ways to provide training for the employment.

Socio-demographic directly changes the education to groups of older people. The organizations and the training providers should evaluate target people and the procedure. The group that records the most spread increasing and that shows the most interest for this type of education is the group of part-time students over the age of 25 years. This new group of 'adult students' are eager for information mainly due to the increased opportunities to advance in careers, and the possibility of a salary raise. They are ideal candidates for universities or for specialized training providers. Declining birth rate and the population aging requires an objective assessment of the real needs for training groups of people with old age.

The brain is the *environment* in which, by sophisticated biochemical reactions, the Mind develops, with all its cognitive, artistic and emotional particularities. The brain is not only a sophisticated *interface* that relates with our Universe (spatio-temporally structured) with a much broader, deeper, archetypal reality. Could be *creativity* without learning? What is the difference in brain *functioning* when referring to an original art work or a discovery, an invention/innovation? The brain is an obstacle or a boon/blessing. The idea of new and beauty/utility is created in the brain, or the sensitivity of a certain brain is able, at a time chosen or well stimulated, to extract the *novelty* from an universal database (called by some Knowledge, at which we all have access).

The creative individuals must be seen at any age like spontaneous children able to highlight their innovative character. They are curious to know and understand and they try to solve any problems that arise although they do many mistakes, they find fictive or too common solutions, they trust their own ability and are always convinced they have found the best solution (e.g. 'I got a great idea ...', 'I must disassemble it to see how it works ...'). These states stand out by a vivid and bright glance, seductive and reflective voice, stormy expression. This activity of searching, questions, emitting solutions, is feverish, passionate, exciting, but may appear the risk of spreading and superficiality. It must be tempered by self-control and must be understood and educated/learned/taught. The first solution is not always the best. Flexibility and creativity have an important role when addressing again the problem or when placing the problem in a particular context.

The period in which we live is one of transition from static to dynamic, from linear to nonlinear, from complicated to complex, from an Information Society to a Knowledge Society. Humanity is not yet fully aware of the depth of changes we are living. Unfortunately, the school, through a difficult to understand inertia, is not able to adapt to the situation. We are daily 'bombarded' by information. This assaults us every moment, and the Internet, on one hand provides us unlimited amounts of data, and on the other hand facilitates communication. It becomes more difficult to process the 'waves' of information.

We manage with an increasing difficulty to extract what we really care about from the ‘ocean’ of data, we communicate increasingly more but often ‘pointless’ and, in these circumstances, we didn’t know yet to renounce at the things that are not really of interest for us. In the opinion of many, Science and technology are responsible for the current crisis, for the daily stress, just because it increased the phenomenon of connecting the human to the exponentially increasing knowledge flow. What means now the school? A place where are found those who want to know, to go further for the personal development, where the future society is projected, where the management of successful careers is made. In circumstances where Information ‘teems’ on the Internet, too few teachers understand that their role is not the transmission of knowledge but to ‘guide’ the formation of People, individualities, enabling the sustainable development of the planet.

A study from United States asserts that the most wanted professions in 2012 didn’t exist in 2005. This means that the speed of society development is so great that today’s teachers are preparing young people which, when leaving the school, will solve problems we don’t know that exist today, using ways about we don’t know will be created.

We see a group of learners as a number or in the best case we compare it as a general result with another one. We forget that each student is a ‘raw’ person, which will absorb more or less the knowledge which he comes in contact, and which will start in the end on his own path. He will be a future specialist if he will have the chance to discover the field in which he can make performance or he will be a waste of Society if he will labour in a job which to provide him just the resources to survive in a rapacious world.

If we understand the School as the entire educational system crossed by a person, does this person realize, at every level and component, the following statements of Florin Munteanu from the Centre for Complex Studies? [www.complexity.ro]:

- It is not enough to be good at your job if you haven’t an appropriate environment in which to capitalize yourself;
- The environment is in fact a result of the individuals quality composing it;
- The change of the environmental quality is not made by the constraint induced by a rule but by the education of individuals.

If our children don’t feel they can communicate, firstly with us, they will be silent. But we must listen even their silences. Before asking the lecturers to educate them and to transform them into humans, let’s do it us, as parents. A teacher begins by being a good parent. Parents never have holidays on their work with their children, as the lecturer has never holiday in his job. Parents can not drop their children for a second examination or not to promote them. Life will give nowadays learners (children) the most difficult quizzes, theses, tests. Life gives to the nowadays learners, but also to their lecturers, ratings, marks and sometimes penalties. No lecturer will be able to say that he has successfully done his work if the learners didn’t receive the answers to the questions that they

knead. And a lecturer is that one who makes the learners to ask questions for themselves.

The curricular cycles are periods of learning which have in common specific objectives and which group together many study years, sometimes belonging to different school levels. These periodizations of schooling overlap the formal structure of the education system, in order to focus the main objective of each school stage and to adjust the educational process by interventions of curricular nature [2].

Each curricular cycle presents a coherent set of learning objectives that highlight what learners should achieve at the end of a certain stage of their learning route. So, the curricular cycles give to the different stages of schooling a number of dominants which are reflected in the programs' structure. The introduction of curricular cycles is intended to [www.complexity.ro]:

- create conditions to expand the compulsory schooling;
- to establish an education structure better correlated with the psychological age of youth;
- to create the continuity between the schooling levels.

3. The specifics of didactic activities

Encouraging students to develop innovation capacity should be based on trust and lecturer-learner collaboration. The idea of authority must disappear completely. The learner must not be regarded as a recalcitrant person or without interest to learn. The role of debate must prevail because polishing an idea or an optimal solution lies in the ability to communicate and to share within a spontaneous association not by forced mobilization. Authoritative and abstract education must be replaced in this case. We can learn to be good lecturers, but we must have abilities for communication, intelligence, affection and volition which to allow the long life learning.

Innovation can not be learned from books, but practicing, formulating ideas, discussing, assessing. Young people must learn to cooperate, making sport (within a team), excursions, choir, dance, civic activities, theatre, etc. From didactical disciplines (subjects) to the extracurricular activities effort must be done in order to form teams which collaborate, therefore work! A thousand people, each bringing a brick to build a school, differ from a thousand people looking at TV.

Within the educational process the lecturer has the following functions [1, p. 106]:

- to orientate and to organize the learners;
- to direct, to manage the learning;
- to adjust the educational process based on feedback;
- to optimize or to improve the teaching-learning processes (reverse connection);
- to evaluate the results of the school activities;
- to take decisions;

- to innovate the educational process.

It is considered that creative abilities are based on the predominance of one or the other cerebral hemispheres. There are the following fundamental human types depending on the predominance of right and left brain hemispheres [3]:

1. Cortical left – logical approach: the Analyst (logical, analytical, quantitative, technical, abstract). The dominance: performance, efficiency, rational thinking;
2. Cortical right – intuitive approach: the Explorer (visionary, creative, synthetic, initiator). Dominance: exploration, concept, ambiguity;
3. Limbic Left – organization: the Supervisor (conservative, calculated, planned, organizer, controller). Dominance: quality, safety, reliability;
4. Limbic right - Communication: the Team man (emotional, sensitive, enthusiastic, friend, loves contact with people). Dominance: communication, connections, emotions.

The aims of the teacher regard: the discovery of each individual capabilities/abilities, to achieve a work began as better possible, the transformation of the learner into a basic person for the community to which it belongs.

The lecturer must continually develop a number of managerial abilities:

- the ability to coordinate activities depending on situations that arise in the didactical process (teaching);
- the ability to plan and organize activities based on learners' interest for a specific field;
- the interest in maintaining the quality of education, regardless the unforeseen situations;
- the ability to permanently motivate the other lecturers.

To these must be added a number of professional skills/abilities:

- extensive specialty knowledge inter- and transdisciplinary;
- the ability to analyze and solve spontaneously problems occurring during the educational process;
- oral and written communication skills;
- creativity and innovative spirit in managing interest topics discussed and in guiding the learners to the topics discussed;
- strategic thinking to return every time to the proposed objectives and their exhausting within the given time.

It is recommended to focus on learners hobbies. These can stimulate the interest for the addressed topic, can bring competitive or team spirit, can stimulate creativity and practicality, can give more energy and curiosity [3, p. 21].

Motivation is generated by the addressed topic and must be centred on thinking exercises, on openings, limitations and unresolved issues and not on how to solve a problem. To transfer definitions from dictionary and to memorize solving algorithms by repetition is the main objective of the traditional school. These things develop the thinking, but 'harden' the reasoning between some

benchmarks difficult to overcome. Training the abilities to think creatively, to assume those thought out (conceived), to check and make connections between fields, to innovate, to think prospective new solutions, to identify unseen aspects of the old unsolved problems, is the objective toward which the lecturer must tend. It matters enormously the environment, the discussions debating the issues, the person which leads the learning process [www.complexity.ro].

The educational communication is regulated by a system of rules able to organize the exchange of information. There are general linguistic norms, socio-cultural norms of the group, and personal style rules. Rules should be well known, to negotiate better the freedoms that we take in relation to them. These establish the minimum cordiality necessary to communicate the message. Human relations always recommend us the equilibrium, the middle way. The most prudent attitude is conformity to what is dominant. Each of us is looking for a personal point of equilibrium between the external force fields (social and professional standards) and the internal force fields (personal standards), an equilibrium between safety and boldness. For the lecturer this thing is important and can essentially determine the success of the education act for long term [4].

The types of communication styles tackled by the lecturer are [3, p. 35]:

- Oral-familiar, that best matches the spoken language and represents the familiar register. Expressions are familiar, are reproduced the actually used languages (slang, dialect, popular terms, plastic expressions, abbreviations), the grammatical rules are lax, the punctuation is reduced to approximation. At this level of language we are when we want to chat with the learners, to preserve the naturalness of dialogues and testimonies.
- Oral-conventional, when we use the common words from dictionary and the simple grammatical forms to construct simple sentences with simple structure. It is mainly used when we want to transmit directly clear and concise information.
- Oral-normalized, which uses technical words, simple grammatical forms, but more complicated syntactic constructions. It is used to write essays, scientific and technical papers, reports, informing works. In order to preserve the neutrality, this style is monitored (not free, like the familiar register) and conventional (it doesn't allow a personal way of expression).
- Oral-argued, when we are focused on the accuracy and correctness of expression, on the stylistic methods for customizing the style. We use rare words, rigorous and complex grammatical and syntactic forms. This register is characteristic to the literary and exquisite university production.

The non-formal designates a less formalized or non-formalized educational reality, but always with educational-formative effect. From a conceptual perspective, non-formal education includes all activities and actions that take place within an institutional framework, in an organized manner, but outside the school system, constituting itself as a bridge between the knowledge assimilated during the lessons and the information gained informally.

The ratio of non-formal and formal education is one of complementarity, both in terms of content and in terms of forms and modalities to achieve. Desiderata of non-formal education are in close connection with the achieving of the following finalities [5]:

- to extend and complement the cultural horizon, enriching their knowledge in certain areas;
- to create conditions for ‘professional perfection or starting a new activity’;
- to support the alphabetization of the disadvantaged social groups;
- to contribute to the participants’ recreation and relaxation and to their free time spending in an organized way;
- to ensure the practice and cultivation of various inclinations, skills and abilities, the manifestation of talents.

Based on an examination of the theory behind the learner-centred education and after some intensive discussions with teachers and students it was developed a list of general principles. These principles are not aimed to build a comprehensive image. They rather present a more clear approach and put under discussion the treated subject [6].

- Learner-centred education requires a continuous reflective process. No context can have a form for learner-centred education that may remain applicable over time. The philosophy is that the lecturers, the learners and the institutions need to constantly reflect on the systems of teaching, learning and infrastructure, in a manner that may continuously improve the learning experience, and to ensure the obtaining of learning outcomes from a particular course or program component, in a way that stimulates the critical thinking of learners and develops their transferable skills.
- Learner-centred education does not propose a solution of the type ‘One-Size-Fits-All’. A key concept is the understanding that all education institutions are different, all lecturers are different and all learners are different. All these variables operate in different contexts and treat various topics and subjects. Therefore, learner-centred education involves a learning approach which requires some learning support structures corresponding to each given context, and teaching/learning styles appropriate to those who undertake them.
- The learner-centred education recognizes the diversity of the learners’ pedagogical needs. Some of them learn best by trial and error, others learn by practical applications. Some people learn better by reading literature, others need to debate and discuss a theory in order to understand it.
- Students have different needs and interests. All students have needs that extend beyond the classroom. Some are interested in cultural activities, other in sports activities or communication.
- The choice is essential to effective learning. Students love to learn different things and, therefore, any offer should involve the choice in a reasonable quantity. Learning can be organized in free formats, as are those from the colleges of Humanities sciences, or the choice can be offered in a more traditional way, in the disciplinary style.

- Learners have different experiences and background knowledge. Learning process needs to be adapted to the life and professional experience of the concerned individual. Personal experience can also be used to motivate the learners, for example by enabling them to share a personal story that would illustrate a viewpoint.
- Learners should have control over their learning. One must give them the opportunity to be involved in the design of courses, curricula and their evaluation. Learners should be considered as active partners who have to gain (or to loose) from the way the higher education works. The best way is to ensure that the teaching is more focused on the learners in the way this learning process should be done.
- Learner-centred education is about ‘to know’ and not about ‘to say’. The approach of learner-centred education aims to give the learner a greater responsibility, allowing him to think, to process, to analyze, to synthesize, to criticize, to apply, to solve problems, etc.
- Learning involves cooperation between learners and lecturers. It is important that the learners and lecturers cooperate in order to develop a common understanding of both the problems appearing during the learning process and their problems as beneficiaries within the institution they belong to, proposing together solutions that might work for both groups. Such cooperation will have a positive effect as both groups will try increasingly more to see each other as partners. Such a partnership is essential to learner-centred education philosophy.

4. Conclusions

The most durable and effective innovations are those assimilated by the beneficiaries, namely because they satisfy their specific needs. Let’s consider what happens at the concrete level of transformations produced by the new information and communication technologies.

First, we observe the conversion of the cultural content worldwide into a digital form, thus making the products available to anyone, anywhere, anytime. The high-speed wide area communications networks, linking the computers from the flats or from the learners’ desks to the high capacity digital libraries, change the cultural conditions in which the education unfolds. Isolation is history and the insufficient and superannuated information are substituted with extensive and more than enough information. The problems of education are profoundly changing, the alternative for an insufficient and expensive knowledge being the finding of strategies that allow unlimited access to culture.

Secondly, are developed multiple ways to represent information, to simulate interactions and to express ideas, expanding the intelligence acquisition, thus altering the spectrum of civilization, changing the requirements of participation in culture. Epistemological development has interesting aspects. Thinking relates closely to language, the formal symbolization from Mathematics and Logics being seen as an extension of the current various

linguistic forms. The digital environment evidently expands the sphere, being used to acquire information and to express ideas in different ways – verbal, visual, auditory or combining all of them. As a result, lecturers will find increasingly difficult to encourage the verbal language handling to the detriment of other ways of expression.

The education of innovation capacity is done in the community but centred on the learner, is done having access to the ‘universal digital library’ but in the field in which the learner proves his abilities and interests, is done through a transdisciplinary approach and an integrative vision from the lecturer.

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