

THE RESEARCH OF THE MENTORSHIP ASPECTS IN THE TECHNICAL FIELD

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A high-performance education almost cannot be thought out of the mentorship. The fostering of the mentorship means a certain factor in the assertion of the performance and the development of the professional careers. Starting from the theoretical aspects of the mentorship (definition of the mentor, the distinction formal-informal mentoring, mentorship techniques and so on) we propose analyse both upright line (with different generations of subjects) and horizontally (different types of mentoring). Thus, are examined the influences determined by the mentor in case of the disciples' professional activity, the relation between the existence of the mentor and the psychosocial variables of the people mentored etc.

Keywords: mentorship, personality, technical field.

One of the social factors frequently studied in the life of high-performance individuals is their relationship to a mentor. Although the term of mentorship has taken throughout the time varied definitions depending on the geographic environment [11] (for instance, in the USA, mentorship is done by *part-time* employment, unlike Central Europe where mentorship focuses on training and formal educational experience), mainly, considers „the systemised relationship between an adult and a child or an adolescent who needs support in academic, career, social or personal purposes“[6]. It thus results that mentorship can be done within structured programs or by means of informal relationships of the type parent-child, teacher-student, between friends of different ages, etc. Next, we embark on analyzing the importance of mentorship starting from its two dimensions or even types that we call *formal* mentorship and respectively *natural* or *informal* mentorship.

A clarifying surprise of what interpersonalization with a mentor means is to be found in the definition as form of „top learning management“[4] with double transfer, in which both the mentor and the disciple are partners in this unique interrelation, in the way that both parties „grow up and develop“ together. The mentor learns from the disciple and he/she is changed by this interrelation in the course of what becomes an exchange process. In this context a number of strategies, practices and behaviours used by the mentors for the development of the disciples is identifies, such as: encouragement in the pursuit with a positive attitude of their own goals, development of the self-esteem by assuming the responsibilities for their own actions, assuming the risks and the transformation from watcher into participant, the correct examination of the beliefs, ideals and values, the use of honest feedbacks by the mentors in the individual stimulation, the supply of a real source of „guidance“ etc.

In the literature dedicated to mentorship there is a distinction between the natural mentorship, according to certain authors, or the relationship to a model, according to others, and the planned mentorship, with the suggestion of the lower significance of the model in the individual development. For instance, by the accentuation of the mentorship institution in the stimulation of creativity [7], the distinction is made between the terms of role-model – the person with a substantial contribution in the structuring of some action, motivation, axiological and intellectual tendencies, which influence by the simple presence the subsequent evolution of the creative – and that of mentor – received as „trainer“, „master“, generator of „apogetic learning“. In the same paper it is proved that in case of many Romanian personalities, such as Babeş, G. Călinescu, D. Leonida and others, in 93% of the cases, they had one or more mentors exclusively among the university professors, in their turn becoming school creators.

Below, we provide some research conclusions regarding the relevance of the role-model and the mentor in performance.

The evidence of the importance of the „role-model“ in the development of creativity is transmitted by a series of sources. Thus, by the study of the worldwide known individuals in various fields as well as their professors [2], it is discovered that most of them had at least one role-model during their childhood (often, one of the parents or a teacher at school). The idea of learning the creative behaviour by knowing and following the example is here suggested.

Another research that shows the crucial role of the mentor in at least a few types of creativity is done on the 92 Nobel Prize laureates [12]. The relationship mentor-disciple is emphasized by the fact that the Nobel laureates are trained by former Nobel laureates or other members of the „scientific elite“. The interrelation of the two cate-

gories is as follows: on the one hand, the disciple emphasizes a pronounced tendency in the search of the masters by reason of a strong motivation for the field and for the „social growth“, gravitating around those who determine the power in the scientific communities, on the other hand, the scientists select their talent co-workers out of the natural human need of transmitting information.

For the technical field, we have embarked on an experiment on over 100 alumni [3]. The result shows that those who had a professor as mentor have recorded significant differences from their congeners in the creativity tests, whereas the alumni who deny they have a professor role-model get high scores in the intelligence tests and low in the creativity tests. We blame this result on the transfer of competency and motivational affectivity which is created in the communication professor – alumnus. Objective: the analysis of the relationship between the mentorship and the personality characteristics.

Subjects – two samples of subjects have been selected from the technical field:

- 1) established subjects (21 high-performance engineers-professors of the technical university field, mostly belonging to the mechanical engineering, with high performances in research and in the teaching work; – 9 subjects are part of the Polytechnic University and the rest of 12 subjects activate in the research institutes). The sample consists in 100% men. Average age: 43,31, A.S. – 7,5;
- 2) asserted subjects (30 subjects emphasized by professional achievements of which 16,6% girls and 83,3% boys, Age – 22,28.

The selection of the subjects was done with the help of a quantitative indicator of creativity which consisted in written papers, articles, research agreements, patents etc., in case of the established subjects and scientific communications, projects, articles, school media, in case of alumni etc.

We assume that the mentorship relationship prevails over the corpus of cognitive, motivational and personality features of the subjects.

According to the objectives and the hypothesis issued the following questionnaires have been applied:

1 – *Questionnaire for the analysis of the mentorship aspects* with predominantly open questions:

- the existence or the absence of the informal mentorship (unplanned);
- the presence or the absence of formal mentorship in the period of schooling;
- the influences determined by the mentor.

We mention that in the preamble of the questionnaire, a definition of the mentor and the role-model based on the research of Teresa Amabile has been suggested [1; 2]. The subjects were expressly required that both the role-model and the mentor should be identified in an actual natural person not made of a puzzle of features to which people in the real life combined to the fantastic or the ideal characters should contribute.

2 – *Personality questionnaire 16 PF* (R.B. Cattell) multiple verified in the personality system of the technical-scientific creator. We provide the 16 factors in short: A – open to the world; B – intellectual vivacity; C – emotional stability; E – submission / dominance; F – communicative expansion; G – conscientiousness; H – bravery; I – sensitivity; L – hypothetic spirit; M – practical spirit/bohemian spirit; N – naivety / social clairvoyance; O – anxiety; Q1 – conservatism / radicalism; Q2 – dependence / group independence; Q3 – self-control; Q4 – ergic tension.

3 – *Questionnaire of creative motivation* [8] used in order to establish the attitude structure: the involvement of the self and confidence in one's own forces, voluntary qualities and value sense, cognitive interest, vocational involvement, directly creative attitudes as well as the creative motivation coefficient (Q.M.C.).

4 – *Test of verbal creativity* [10] for the diagnosis of creative thinking.

5 – *Questionnaire of cerebral preferences* [9] validated per multiple categories of subjects, including designing engineers, researchers, IT technicians, mathematicians etc., used for the emphasis of the sector cerebral dominance (left cortex, left limbic, right cortex, right limbic) and of the cognitive styles coming from the combination of the cerebral areas: rational, emotional, analytic (left means of operation) and synthetic (right means of operation).

The following data have been obtained:

A. For the *established* subjects, regarding the variables of informal and formal mentorship, 60%* and 40% of the engineers are situated in the “positive” area of the variable, emphasizing the fact that the exemplarity in the period of the childhood and adolescence is susceptible of the association to the creative performance. We mention that 30% of the cases have benefited from both supports, both the informal and the formal one.

For the group of *asserted* alumni, we have noticed that 36 % declare the relationship to a mentor and 63 % consider that they have benefited from the privileges of an informal mentorship during childhood, most often from the parents.

B. Regarding the *influences* determined by the mentor, the engineers who had the experience of mentorship have contributed to the es-

establishment of the following picture: on the first places are the creative style of thinking, the will to initiate new activities, new tasks, and the formation of the character (67 %); on the second place there is the subject (30 %) followed by the productive style of work, sensitivity in observing the truly important issues and the need to improve oneself (28 %), and lastly, perseverance (16 %). We notice that, mainly, the mentor influences features that belong to the cognitive style and secondarily, the creative attitudes. For other batches of high-performance engineers [7], the influences suffered from the mentor have been ranked in the following hierarchy: the working method, the professional training, the opening of the horizon and the teaching skills. Although, in this study, the categories of contents are wider, we notice the resemblance between the results, meaning that on the first places there is the stylistic aspect and in the end the opening of the horizon, the need for self-improvement or perseverance.

In case of *asserted*, essential are the working techniques learnt and the encouragements received (46.6%), the innovative style of thinking (30%) and in the end, the accomplishment of the university achievements (23.4%).

The basis on which the principality of the stylistic element appears in the influences of the mentor in the subjects of the technical field must be searched for in the comparison to a batch of university professors [7]. In this case, the mentor's social-human side is emphasized; thus, by reason of his authority, the mentor forms, in order: the personality, the professionalism and the relationships between people, self-esteem, the personal creativity and charm.

C. The co-relational analysis between the analyzed variables (*table no. 1*) shows us that for the *established*, the informal mentorship is directed mainly on the conscientiousness (the G factor is considered in Cattell's theory as being formed under the pressure of the social norms). It results that the presence of the creative role-model is a good prognostic for activities requiring perseverance, honesty, constructivism, mental organisation and ... professional success.

Moreover, in the case of the group of *the established*, informal mentorship presents positive co-relations to a large extent with the left cerebral sector, too (specialized on the technical, logical, analytical thinking etc.) – (C.S.) Thus, the propensive function of the role-model for the technical interests is confirmed, and to conclude with, the possibility of education a cognitive analytical / logical style.

To the influences exerted by the mentor we can also add the data resulted from the high connection between the variable „mentor“ and a few psychological variables: the vocational involve-

ment – a major factor in the structure of the creative attitudes and two personality factors, the communicative vivacity (F – a factor recognized in the theory of R.B. Cattell as being in the composition of structure of highly creative people) and the ergic support (Q4). Moreover, it is proved that the factor of communicative expansion supports the influences of the training environment to the extent that research shows that the expansive have generally had an easier optimistic environment.

For the *asserted* subjects, we did not obtain any co-relations between the informal mentorship and other psychological variables, in exchange, the relationship to a mentor co-relates with the responsibility / conscientiousness, creative motivation, by the development of a wide range of knowledge interests, and the creative imagination (M). The most interesting is the relationship to this factor M which exposes the possible mood of the imaginative people centered on the inner motivation towards the mentorship. The mentor, one can say, finds the ideal person to transmit his/her knowledge.

The study accomplishes a vertical comparative analysis (with layers of subjects having different degrees of performance) and horizontal (by the representation of the fundamental dimensions of the mentorship in step with the criterion of the institutionalisation). The results obtained show that:

- the established subjects with developed performances and ages have benefited to a large extent of the relationship to a mentor, whereas for those of young ages, in the current period, this type of learning is decreasing.
- informal mentorship or the relation to a role-model plays a bigger part than the formal one in the current alumni, whereas the balance is reversed in case of engineers, the latter benefiting from institutionalized mentorship during college;
- in the case of established subjects, the influence perceived from the mentor is preponderantly stylistic unlike the alumni where is, more likely, motivational and developing personality features;
- the informal mentorship correlates to the responsibility / conscientiousness and vocation for the scientific field (and secondarily technical one), and the institutionalized mentorship contributes to the stimulation of the creative motivation and the augmentation of some personality features such as the imaginative spirit, the communicative vivacity and the ergic support.
- the scope of superposition of the two types of mentorship is given by the fact

that both grow the motivation for the working field (study) and activate the part of the brains corresponding to it;

- mentorship does not prevail directly on the creative potential, maybe if the left cerebral hemisphere and the rational style enter the scene.

Tabelul 1

Intercorrelation of variables

Var. Samples		G	CS	Voc.	F	Q4	SR	MC	Cogn.	M
Established subjects	Infor-mal	.79*	.84*							
	For-mal			.89*	.76*	.80*	.81*			
Asserted subjects	Infor-mal	.48*								
	For-mal							.58*	.60*	.54*

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Стаття надійшла до редакції 27.03.2009 р.