ORIGINAL RESEARCH PAPER | Education | Volume : 6 | Issue : 9 | September 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Academic Learning in The Technical Field Styls of Learning in Students Department for Teaching Staff Formation in The Technical Field

KEYWORDS: academic learning, styles of learning, questionnaire VAK, technical field, department for teaching staff

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ABSTRACT *In introduction of the paper we define academic learning and identify, from the specialized psychopedagogical literature, its structural factors: age factors, individual factors such as cognitive, emotional-motivational and behavioral factors and also group factors related to students activities and students learning context. In the second part of the paper it discusses several meanings and classifications of learning style after different criteria and authors: David Kolb, Peter Honey and Alan Mumford, Barbe Walter Burke, Neil Fleming. Part three analyzes the learning style of students in the technical field and the relationship between the learning style and the teaching style, analysis that led to the formulation of questions that generated the research hypothesis.*
The two hypotheses of the research are: 1. In view of the specifics of learning in the technical field, of technical skills and competences training, the most common learning style would be the practical style, predominantly. 2. The learning style of pupils/students mainly reflecte the teaching style used by the teachers (their circularity).
In the fourth part of the paper we present the description of research: sample that consists of 104 students from 7 technical colleges, VAK type questionnaire developed by Adriana Nicu from "L. Blaga" University of Sibiu, Romania, and characterization of learning styles. In the fifth part there are presented the research results regarding distribution of learning styles, students gender, faculty belonging of the students. In the sixth part, interpretation of the results is presented in relation to these two hypothesis. The findings reinforce the image character of the society we live in, and materialize a differentiation between technical colleges to which the research was applied on learning styles.a

INTRODUCTION ACADEMIC LEARNING MAIN FACTORS AND THE STRUCTURE OF ACADEMIC LEARNING

The students' learning develops during its evolution certain *specific characteristics* comparing with the pupils' learning. These characteristics reflect the particularities of age, but also the individual characteristics of the students: of intellectual, motivational, behavioural nature. Also, the educational, scientific, technical, artistic field where the students are active leaves traces in the academic learning. Thus, we can distinguish several categories of factors that define the academic learning:

Factors of age that reflect the person's *growing up*: for example, the age can lead to an increased autonomy in learning, contribute to the learning activism, and increase the complexity of learning. These factors of academic learning stimulate the development and applicability of the *model of self-organized, self-managed learning* (Siebert, H., 2001).

Cognitive individual factors that refer to the development of certain individual characteristics of personality, such as: reflection, analysis, synthesis, abstracting, concretization, flexibility. These cognitive factors can lead to the reflexive learning, analytical learning, synthetic learning, abstract learning, concrete learning, mixed learning.

Affective-motivational individual factors that reflect the energetic, motivational, attitudinal aspects of learning: motivational-intrinsic learning, customized learning, learning adapted to stress.

Factors that refer to the behavioural aspects of learning: *self-management of learning* (Konrenblit, P., 1982), *responsible learning.*

Factors that reflect the students' *field of activity*: technical field that can lead to the concept of ***technical learning***, artistic field that can lead to the artistic profile of learning.

Factors that reflect the students' *context of learning*: explosion of information and implosion (reduction) of time to process it, change of students' hierarchy of values, interests, strategies of communication.

At the level of contemporary thinking (Saljo, 1979; Van Rossum and Schenk, 1984; Orell, 2005; Neacşu, 2003; Perry, 1999), independent academic learning has both significations of ***product, mental structure, as well as process***, acquisition of facts, abilities and methods that can be used according to the necessities of contexts (apud Ioan Neacsu, 2006).

Wolfs (2001) as well as Thomas and Rohwer (1986) refer to ***product behaviours:*** of giving back, recognizing and applying; observation, understanding and interpretation; giving examples, conceptualization and structuring; sum up/ synthesize and solve problems; relational, criteria and reasoning analysis. Weinstein and Mayer (1986), Archambault (1990), Boulet et al., (1996) refer to ***process, strategic behaviour*** of intelligent, creative repetition; elaboration, organization and control ; understanding and affective-emotional company, etc.; Thomas and Rohwer, 1986 talk about ***activities, processes and functions:*** informational selection; understanding, with demonstration of epistemological obstacles; memorization; (re)constructive integration at the level of the relations between behaviours; cognitive control; self-management of time and effort (apud Neacsu, I., 2006).

II. STYLES OF LEARNING: SIGNIFICATIONS AND CLASSIFICATIONS

A synthetic component of academic learning that can be identified both as process and product of knowledge, per-

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sonality, orientation of preferences and options of the student is the ***style of learning.***

Style of learning – was defined by Jinga and Negret (1994) as "a complex of inter-related human characteristics, stabilized in time and space," and Keefe and Ferrell (1990) consider the style of learning as a model that combines the internal and external operations resulted from the *behaviour, personality, attention, cognition, specific reactivity and orientation of preferences/options, all expressing the level of development of the subject and being reflected in their specific behaviour*.

We can define the style of learning as the main and synthetic modality of a person of reception, processing, memorizing and actualization of the information as result of their genetic evolution, learning and experience in time.

The style of learning **has in its structure:**
-***preference*** for a main (major) manner specific of de *perception, of concrete or abstract knowledge, analytical or synthetic, of memorization and actualization of the information;* the ***option*** for a relatively explicit model of *strategies, methods, instruments, techniques and procedures* with resonance to the particularities of academic learning, contextualized and motivated; relatively explicit ***behaviour*** regarding the possibly optimum utility of the *emotional values (adaptation to stress), motivational (centres of interest, valences), character (sense of responsibility, control of stability of the purposes and decisions*), in a certain ergonomic and eco-psychological environment – light, temperature, design, furniture, (in) sound, socio-group composition, etc.

The styles of learning were classified according to:
Types of intelligence described by Howard Gardner (1999) as follows: style of learning/*linguistic-verbal intelligence*, style of learning / *spatial-visual intelligence*, style of learning/*musical intelligence*, style of learning/ *kinaesthetic intelligence*, style of learning/*logical and mathematical intelligence*, style of learning/*naturalist intelligence*, style of learning/ *intrapersonal intelligence*, style of learning / *interpersonal intelligence***,** style of learning **/ spiritual** intelligence.

Modalities of thinking and the proportion between sensorial and thinking: *active/reflexive, sensorial/intuitive, visual/verbal, sequential/global (*Soloman & Felder, 2002*).*

Types of teaching: *teaching/ visual learning, teaching/ acoustic learning, teaching/practical learning.*

According to different criteria, several models of learning styles have been elaborated:

David Kolb (1976), author of the theory of experiential learning, after the modality of processing information, identifies the styles: accommodator, convergent, divergent, assimilator. The one who learn by **adaptation** combines the active experience with the concrete experience. The **convergent** style combines abstracting and generalization with active experimentation. Those who learn by **divergence** combine the concrete experience with observation and reflection. Those who learn by **assimilation c**ombine observation and reflection with abstracting and generalization.

Peter Honey and Alan Mumford (1982) classify the following styles of learning: active, reflexive, theoretical, pragmatic. The persons with an **active** style of learning act, get involved in new experiences, work well in a group, lead discussions and activities. **Reflexive learners** observe, gather data, analyse, need time to draw conclusions. **Theoretical learners** observe and assimilate the facts in coherent and logical theories, work well in clearly structured situations. **Pragmatic learners** react to problems and opportunities, experiment new ideas, take practical decisions.

Walter Burke Barbe (1981) according to the criterion of mainly sensorial modality identifies the styles: visual, acoustic, kinaesthetic.

Neil Fleming (2012) focuses on sensorial modalities by which a learner perceives the information: visual, acoustic, reading-writing, kinaesthetic.

III. STYLES OF LEARNING IN THE TECHNICAL FIELD. THE RELATION BETWEEN THE STYLES OF LEARNIND AND STYLES OF TEACHING

The experience of over 35 years of education and over 25 years in upper education in the technical field led us to the conclusion that there is a strong relation between the field of study and the style of learning. The requests specific to the technical field in the upper studies aim at: technical thinking, active mental processing in the technical field, specific technical competences, technical interests, high motivation for the technical field, technical creativity.

In the class of pupils or in the group of students, the relation between the pupils/students style of learning and the teachers' style of teaching locates of the level of evidence. The teacher can use different strategies of teaching/learning, as follows:

1. Teaching, learning, evaluation, mixed

2. Direction, semi-direction, partial non-interference

Inductive teaching/learning, deductive teaching/learning, teaching/learning by analogy, combined teaching/learning

Teaching/learning based on communication, teaching/learning based on research, teaching/learning based on productive activities

Teaching/learning based on programming

These strategies of teaching have the role of forming appropriate strategies of learning. Thus, a teacher who uses mainly the strategies of leading the pupils will obtain as effect reactive, obeying, disciplined behaviours. As the degree of leading decreases, the degree of autonomy can increase and even the pupils/students creativity. The inductive style of teaching leads to outlining an inductive style of learning. Teaching based on communication stimulates the communication in pupils/students and leads to the increase of their communication skills.

Based on the way of conceiving the didactic activity, the style of teaching can be:
focused on the process of adapting, of going from actual experience to active experimentation; **focused on the process of convergent thinking**, at the limit between the active experience and conceptualization; **focused on the process of assimilation,** at the limit between conceptualization and reflexive observation; **focused on the process of divergent thinking**, at the limit between reflexive ob-

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servation and actual experience (Cristea, S., 2005). These styles of teaching lead to the formation of styles of learning: accommodating, convergent, divergent, assimilator.

According to the components of the teacher's personality, the style of teaching/learning can be: **cognitive** - mainly intellectual, through the logic of argumentation, scientific language; **affective,** with affective involvement, participation; **volitional,** stressing on organisation, methodology. The style of cognitive teaching requests from the pupils the use of scientific language, development of argumentation logic that will be at the basis of the formation of an intellectual style of learning. The affective style of teaching stimulates the affective involvement in learning. The volitional style of teaching develops in pupils/students the will to learn, the organization of learning.

On studying the relation between the technical field and the style of learning of the students, even questions came up:
1. What is the most frequent style of learning of the students at a technical faculty, on taking into account the criterion of preference for a main manner of perception: visual, acoustic, practical (kinaesthetic)?

Which relation is there between the style of learning of the students and the teachers' style of teaching in the pre-university education and at university?

Thus, the following hypotheses of the current research have appeared:
1. On taking into account the specific of learning in the technical field, of formation of skills, abilities and technical competences, the most frequent style of learning should be the *practical style*.

The main style of learning at pupils/students reflects mainly the style of teaching of the teachers (their circularity).

IV. DESCRIPTION OF THE RESEARCH

The sample is made of 104 students in the first year, at the faculties: automatics and computer science, electrical engineering, electronics, architecture, civil engineering, mechanics, science and engineering of materials, but who are at the same time following the programme of psychopedagogical formation.

The questionnaire applied of type VAK (visual, acoustic, kinaesthetic, according to Walter Burke Barbe, 1981) was made by lecturer PhD Adriana Nicu from University Lucian Blaga in Sibiu and is made of 39 items, each with yes or no answer. For the visual style, we take into account the positive answers to 13 questions. For the acoustic style, we sum up the positive questions from other 13 questions. For the practical style, we gather the positive answers from other 13 questions. The highest number of positive answers outlines the main style of learning. If two styles of learning obtain the same number of points, the style of learning is combined.

The characterization of the styles of learning according to the predominance of a modality of reception of the visual, acoustic and kinaesthetic information:

The one who formed a visual style of learning:
- Takes notes or draws
- Prefers graphics and images
- Prefers especially to look than talk
- Is well organised
- Remember what they see
- Notices the details
- It is important to see the written text
- Learns based on images, maps, graphics, diagrams
- Re-reading/re-writing the materials are methods of learning

Acoustic:
- Remember what they see or hear
- Speaks loudly with themselves
- Likes listening to others reading
- Talks while working
- Likes discussions in the class
- The noise distracts their attention
- Hums/sings
- Learns based on teacher's explanations
- Expresses in words the action done in order to learn
- Is efficient in the group discussions

Practical:
- Remember what they do
- Solves the problems effectively
- Finds way to move
- Cannot sit for a long time without moving
- Needs to involve physically in the activity of learning
- Learn from the situations where they can experiment
- Has good motor coordination

V. RESULTS OF THE RESEARCH

1. On analysing the main styles of learning, we noticed that:
- 41 of the students got the *visual style*
- 27 of the students declared that they learn mainly acoustically
- 15 students learn *practically*

TABLE – 1
CLASSIFICATION OF STYLES

visual	41
acoustic	27
practical	15

2. Those who have the same number of points in two styles are 21 in total, classified as follows:
- 9 with practical-acoustic style
- 7 with visual-acoustic style
- 5 with practical-visual style

TABLE – 2
MIXED STYLES

practical-acoustic style	9
visual-acoustic style	7
practical-visual style	5

3. According to the students' gender, we identified the following results:
- Boys divided as follows: **30 visual**, 13 acoustic, 12 practical, 11 mixed style of learning
- Girls divided as follows: **14 acoustic**, 11 visual, 3 practical, 9 mixed style of learning

TABLE – 3
STYLE OF LEARNING AND GENDER

Gender/style of learning	visual	acoustic	practical	mixed
masculine	30	13	12	11
feminine	11	14	3	9

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TABLE –4
STYLES AND FACULTY
4. According to the faculty, we obtained the following distributions:

Faculties/ style of learning	AC	ETTI	IEEIA	ARH	CO	MEC	SIM
visual	14	5	7	2	3	3	3
acoustic	7	7	4	2	4	-	2
practical	4	4	2	-	1	2	2
mixed	6	6	5	-	-	1	-

VI. INTERPRETATION OF RESULTS

1. The results obtained invalidate Hypothesis no.1, based on which the practical style of learning should be predominant in the students' learning at a technical university.

Hypothesis no.2, based on which the main style of learning of the pupils/students reflect mainly the teachers' style of teaching (their circularity) is confirmed by the results of the research. Because in the society of the image that we cross in the Romanian education implemented successfully the technology based on information and image (drawings, graphics, diagrams, modelling, simulations), especially in the technical field.

VII. CONCLUSIONS

1. The fact that most students obtained the mainly visual style of learning is an effect of the Romanian education, mainly visual, based on image, graphics, diagrams, in a society of the image.

2. The mainly practical style in a number of 15 students out of 104 represents 14%, which is a very low percentage for the students of a technical university.

3. The mixed styles represent also a very low percentage of 20% of the sample of students researched.

4. Based on the criterion of gender, the male students have a mainly visual style, in percentage of 28.8%, and the female students have a mainly acoustic style in proportion of 13.4%.

5. Based on the criterion of the faculty where they study, most the **visual** students are at **AC** and IEEIA, most **acoustic** are at IEEIA, most **practical** are at **AC**, ETTI, and most of the students with the **mixed style of learning** are at **AC** and ETTI. The faculty of Automatics and Computer Science obtains a special status among the other faculties because of the level of upper formation.

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