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Cognitive and learning styles and a method of discourse in higher education teaching

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Abstract

The paper deals with the outcomes of a broader exploratory research, aiming at considering the relation between cognitive styles and discourse method from the angle of empowering emancipatory potential of students. The method of systematic non-experimental observation was used in the research. The research focused on the following problem: how important are cognitive and learning styles for the acceptance of discourse method. Thus, a thesis has been tested on the influence of cognitive and learning style on the acceptance of the method of discourse in higher education teaching, the efficacy of its motivational and cognitive aspect, as well as the reaches and limitations of the attempts made in higher education teaching to encourage self-reflexive, self-managed learning of students. The sample is occasional – 564 Belgrade university students. The criterion variables were the opinions of the subjects on the adequacy of discourse method and their cognitive reactions, and predictive variables were the method of discourse and success.

The main findings are: motivation and success of students are statistically significant for the acceptance of the method of discourse (participation); abstract cognitive style significantly correlates with the acceptance and the efficacy of discourse method; characteristics of learning styles falling within meta-components permeate positive opinions on the method of discourse. A conclusion could be drawn that the correlation between students' participation in the method of discourse and their satisfaction with the method is significantly influenced by the characteristics of their cognitive and learning style (flexibility, readiness for risk-taking...).

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Keywords: First discourse method; cognitive style;

1. Introduction

Through the reform of university studies implied by the implementation of the Bologna process higher education didactics has found itself in a position to have to reconsider its concepts, as well as teaching methods within them. It has tried to innovate teaching methods and contribute to higher reaches of quality of university studies, which have up to now been mostly assessed as structural changes, leading to the coherence of European higher education space, but insufficient. Essential changes that should have directly contributed to the quality of studies are still not visible enough. It is even considered in Serbia that the quality of studies has been deteriorated mostly due to the fact that the changes were formal and imposed from the outside, introduced without serious analysis of the current condition of

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educational system, copying other systems, from other cultures... There is serious criticism regarding the standards for the accreditation of programs and institutions, not reflecting the tools which would essentially improve the quality of studies. Most often an assessment can be heard that what has been created through the structural reform is the university of “III secondary level” (continuation of secondary school) with studies being to the great extent made school-like, losing its essential characteristics through the decrease of the level of demands at academic studies, limited broadness of studies, limitations regarding the scope of learning material, i.e. literature through the number of ECTS, the lack of differentiation between academic and professional studies, structural changes according to which studies have become increasingly more school-like, fragmentation of fields to modules, terms... In such a way the criticisms of Liessman (2006, p. 79), according to which the taken course could be classified within the “misconception of learning society”, resemble those heard in Serbia that, apart from the previously mentioned, have emphasised the negative aspect of functional knowledge, i.e. technocratic approach to knowledge. All this leads to a general impression that in administrative and organizational aspects of the undertaken reform steps quality of studies and science in universities have been lost, imposing the need to pay more attention to the development of innovation strategies, referring to organization of learning contents, teaching materials and teaching methods, nurturing the “culture of teaching and learning”. The latter was a subject of a broader research and its significant findings are presented in the paper.

2. Theoretical background and terminological delineations

It seems that the previous observations lead to a statement that insufficient attention has been paid to higher education didactics, which would be in the function of reaching the aims leading to self-organized learning of students. self-responsible and self-determined characteristics whose purpose is for students to acquire the competences young people are expected to have not only in the world of labour, but according to contemporary social currents. In other words, what is needed is for the contents of university studies to be generated from research and that they need to undergo a didactic transformation by the very scientist who teaches, turning scientific contents into the subject of students' educational process. Higher education didactics, as well as didactic of particular subject matters, is expected to offer constant help to teachers to recognize the needs for innovation of learning contents organization, of teaching materials and methods, due to the fact that the assumption of success of the Bologna process is the process of the establishment of “teaching culture”, which has not happened yet. Didactics impulses in this sense lead towards the ways of changes at the very didactic scene, towards the possibilities of innovating teaching and learning strategies at higher education level. One of the attempts to respond to these didactic impulses is the implementation of discourse as a method of instruction in higher education teaching, aiming at reaching the aims of emancipatory didactics.

Having in mind that the discussion on classification of teaching methods as well as on the meanings of the terms similar to discourse (dispute, dialogue, etc) would require a lot of attention, since there is no unique and generally accepted classification (with its determination depending on theoretical context of teaching and learning), we have chosen to use the term *discourse as a teaching method* in the text, so that we could mark innovative approaches to instruction in higher education teaching, as well as the changes in the strategies of teaching and learning in emancipatory didactics, i.e. a teaching method that is appropriate for the demands requiring empowering of the emancipatory potential of students. The main characteristics of the method are as follows:

- discourse implies a conversation led in the form of discussion on a topic, i.e. an issue;
- a discussed issue should be expressed in a polemical manner, so that it opens up possibility of expressing different viewpoints and providing arguments in favour of various standpoints, interpretations, opposed opinions; this leads to a possibility to choose the issues that have not been clearly and unambiguously explicated in science, seeking for further research;
- a discourse implicitly involves discussions broader than a discourse, referring to more expressed conflict of opinions in the situations when science has no clear answers, imposing the need for further research and argumentation of standpoints, getting into more serious scientific waters, the problem of methodology, etc; in other words, it could be said that it involves the elements of dispute in its original sense.

The choice of the term discourse is grounded on the standpoint that it can imply a teaching method according to which instruction develops in such a way to guide students towards self-organized search for information, making independent conclusions according to the information they gather, creating their own standpoints accordingly, expressing their observations on the problematic issues science has still not offered undisputable answers for, expressing their opinions, discussing... It is expected that this could lead to practical expression of participative epistemology, self-determined and self-organized learning, along with mentor guidance of a teacher who is in the function of realization of emancipatory potentials of students. In such a way a number of already familiar methods are getting closer to one another, their characteristics, i.e. their basic elements are intertwined, while, on the other hand, their manifested expressions and their functions have a different form and contribute to different aims. In this sense, it seems that they are heading towards the realization of basic intentions of the Bologna process, contributing to conceptual changes in accordance with contemporary philosophy of knowledge, as a framework of pluralistic concepts in emancipatory didactics and empowerment of emancipatory potentials of students as subjects in learning process.

At this point it seems necessary to give a couple of statements on cognitive and learning styles. Looking back it could be said that the research in the field of learning styles have been a current issue for a decade or two, and they are closely related to those dealing with cognitive style, achievements in school environment, creativity, etc. In an attempt to cast light on the distinction between the terms like cognitive style, learning style, learning strategy, closely connected with intellectual abilities, majority of researchers have considered that cognitive and learning styles are closely related to intellectual abilities (Stojakovic, 2000, p. 11). Therefore, according to Stojakovic, it is considered that cognitive and learning styles are at the borderline between intellectual abilities and personality features. However, the statement is certainly not sufficient for offering neither a definition of the terms nor their distinction, let alone operationalization implied by the research. The development of psychological knowledge has followed the needs of didactics for more solid insights into the abilities and needs of students; consequently the procedures of individualization according to the increased knowledge on individual cognitive abilities, have gained broader grounds for more reliable identification of distinctive organization of personality features and abilities of individual categories of students. Thus, through the growth of psychological knowledge, cognitive style has appeared to address the needs for more certain and comprehensive cognitive functioning of a personality (due to the standpoint according to which IQ is not sufficient as an orienting point for individualization of teaching. As hypothetical construct, cognitive style should enable classification of a greater number of psychological functions under a single theoretical model, facilitating the process of getting to information on the complex field of cognitive functioning and gaining insights into cognitive strategies used by a personality approaching diverse problem situations. Empirical validations of the particular features of the term are not unique, leaving a lot of questions open; on the other hand, recent insights into the nature of the phenomena of cognitive style have accepted it as a notion whose essence involves multiple complexity of simple and complex cognitive processes, as well as the outcomes of numerous factors (Gojkov, 1995, p. 49). It is believed that creative potentials of an individual can be encouraged, forming flexible knowledge structure, if cognitive style characteristics are known. Further insights into the phenomenon, its appearance and various definitions, as well as its determination in regard to the notions involved in the context (creativity, intelligence...) should be found in the stated references (Gojkov, 1995, p. 56). So, cognitive style involves stable individual characteristics and the differences in the way of perception, thinking and problem solving (Radovanovic, 1982, p. 6). One of the frequently stated definitions is the one offered by Messik (according to Gojkov, 1995, p. 19) emphasizing the habits of a student to acquire knowledge according to specific ways of perception, memorizing, thinking and problem solving.

Learning strategies refer to the approach of individuals to certain content, as well as to the manifestation of cognitive style in learning strategies. Learning strategies are considered to be manifested link between teaching style, on the one and the structure of cognitive style, on the other hand. The literature often states the so called "primary strategies" dealing with the techniques of identification, understanding, remembering and using more difficult and unusual content parts. It is considered that the role of supported learning strategies is to establish a suitable attitude to learning according to which the subject, through the modification of his own behaviour decreases the level of anxiety in learning situation and prevents the loss of concentration, caused by frustrations.

It is considered that learning styles are cognitive, affective and physiological personality features appearing as relatively stable indicator of perception and relation towards the environment that serves as the source of knowledge (Keefe, 1987, p. 7). According to many other authors (ibid), learning styles reflect genetic laws, development of personality and its adjustment to the environment; they help a person to get to know oneself better, to understand the importance of differences among individuals; as such they can be appreciated in teaching. Learning styles are thought to be structures broader than cognitive styles (Gojkov, 1995, p 20), involving affective, as well as a group of physiological styles. According to many other authors, they also include environmental factors, i.e. individual's reaction to the differences arising out from the environment. Cognitive styles are only one area within learning styles, only conditionally having clearly expressed cognitive, affective and physiological dimensions, having in mind that the process of learning implies integral activity form (Gojkov, 1995, p. 21). Having this in mind it can be concluded that the reason learning styles are chosen to be considered refers to comprehensiveness characterizing them; as such they encompass individual differences of students in their approaches to learning; in other words, learning styles involve cognitive characteristics of knowledge acquisition or cognitive style, as well as strategies or techniques, approaches to contents.

Theoretical context the research could rely on is rather broad and involves a number of psychological: humanistic and phenomenological psychology, Jung's view on the dynamics and typology of personality, contribution of cognitive psychology to research on cognitive styles, contemporary views on cognitive abilities – Sternberg, Gilford, as well as mediation theory dealing with structures mediating between a stimulus and a reaction. Due to these structures, the subject is active in his adjustment to context, i.e. learning.

Humanistic interpretation of learning process and motivation has pointed to personal freedom of choice of an individual, self-determination and striving for self-actualization (Maslov, 82, as cited in Stojakovic, 2000, p. 35). This theoretical orientation has emphasized the importance of intrinsic motivation, which is in the basis of the choice of discourse method, whose reception by students has been considered in the research. Theoretical framework includes emancipatory didactics, as well, within which it has nowadays been considered that cognitive style, as a construct, and learning styles can significantly facilitate emancipation of students, using pluralistic cognitive style as a basis of pluralistic educational concept (Bojanovic-Djurisic, 2009). What is significant for learning style is didactical orientation towards the students, his/her autonomy implying participatory approach to learning. The guidelines of the Bologna process have put special emphasis on this.

Theoretical framework of the research, apart from what has been stated above, refers also to emancipatory didactics, based on pluralistic educational concept, grounded on democratic values, on ontological and gnoseological assumptions of pluralism in philosophy; within pedagogy it is grounded on the postulate of functional and critical process of democratization in university and society, leading to "student-oriented didactics" whose aim is to practice self-determination and self-responsible and co-responsible action. Therefore the paper considers the didactic aspects of discourse as a teaching method in higher education teaching, expecting to reach these tendencies; furthermore, its reaches and limitations in regard to cognitive and learning styles of students are also discussed.

Teaching quality management, especially in higher education teaching, is considered an essential determinant of sustainable development in the conditions of highly competitive global market. The strategy is characterised by an emphasized note of innovative development, based on the management of changes that do not stop at the level of adaptive responses to the environment, but rather emphasize new competences for the world of employment. Among these a special place belongs to readiness for change. Psychologists explain such a readiness according to specific cognitive, affective and conative functioning of a person. In cognitive sense, this competence refers to flexible, creative thinking which is not dogmatic, as well as to ability to accept pluralism of ideas; in affective sense, it refers to the ability to tolerate suspense and uncertainty, while in conative sense, it refers to taking initiative, being innovative and ready for risk taking (Djurisic-Bojanovic, 2008). As a consequence, we are facing the idea that it is necessary to prepare young people for the world of work and life in general in pluralistic educational concept that should involve flexibility of educational models, with greater number of optional courses, along with the creation of personalized programs and multi-perspective teaching. The following didactic means of the flexible educational model are usually mentioned: team work, cooperative and individualized work, dialogic methods, nominal methods, the "brainstorming" method (Ibid). Pluralistic education concept is based on democratic values, ontological and

gnoseological assumptions of pluralism in philosophy, as well as on the postulate of functional and critical process of democratization in school and society in pedagogy, leading to “student-oriented didactics” with a task to practice self-determination and co-determination and to enable self-responsible and co-responsible action (Kron, 1989). However, the didactic orientation supported by such arguments does not fully insist on social constructs of individual action. In other words, this is another didactic theory that has not been completely positively assessed. It has been reproached for the insufficiency in its efforts made for the aspect of relations and contents at getting closer to democratic self-comprehension of society in an integrated and balanced reality construct, through realization of self-determination and co-determination in the processes of learning and teachings at the institution of a faculty as a subsystem. In this sense, criticisms have been expressed to the postulates of communicative didactics of Schaffer and Schaller in which personality related to emancipatory postulate is in the basis of open curriculum. In such a way, the extreme tendencies towards relativism of contents and types of learning have become omens of “open didactics” suffering from severe criticisms here in Serbia, as well. Meta-theoretical discussions on student-oriented didactics have been going on for years, and some of its statements would be the following:

- “self-determination” does not appear only as the most important aim of pedagogic process, but broader, as the only valid organizational criterion that can be met only if it is immediately manifested;
- the terms of “self-determination” and “emancipation” are insufficiently explained: it has neither been analysed what their relation to other notions (individuality, personality...) is, nor this has been put into *ens sociale* setting.

The limited space does not allow broader discussion, but let us at least mention the influences of postmodernism on the meta-theoretical conceptions of pedagogy, underlying theoretical frames of didactic concepts (Frankfurt school – Adorno, Habermas and others; critical rationalism – Popper and others and their reflections on didactic models – Klafki, Mollenhauer and Blankerz...) and nowadays making almost unlimited didactic map of Europe; we would also like to point out that the pedagogues today tirelessly cite the two basic notions of Frankfurt school: discourse and emancipation, even though numerous questions have arisen regarding the notional determination of the term “emancipation”; as a consequence, it was not possible to create a pedagogical theory to be an undisputable orienting point in practice; as a consequence, critical theory has become an unrealized program, while the discussions on critical pedagogy in Europe have become less passionate, giving their way to the standpoints of Kuhn and Feyerabend in their discussions on paradigms; what has been under dispute refers to the objectivity of modern science, warning about scientific results being dependant on paradigms (Kuhn), i.e. certain discourses (postmodernism). With its assumptions on equality and incommensurability of scientific knowledge as compared with other types of knowledge, postmodernism has even surpassed Kuhn, having created a number of didactic conceptions at the scene of Europe, under the influence of various scientific-theoretical concepts. Many didacticists have had high hopes for the perspectives of postmodernism for didactics. As a consequence, some of them are dedicated to the task of articulating postmodernism believing that there are many valuable ideas there and that didactic approaches can be improved through careful use of “alternative voices” that can often be heard in the field of didactics. At the same time, there are numerous authors who hold that many relations of fundamental postmodernism notions have not been illuminated within didactics. As an illustration, we would refer to the relation between postmodernism and constructivism, according to which postmodernism is seen as a new philosophy and constructivism as a general cognition theory, explicating our understanding of the world. It is significant to invoke the fact here that the roots of a number of constructivistic views on cognition can be found in postmodern philosophies that have been separated from rationalistic, objectivistic and technocratic tendencies of “modern” society, as well as that the philosophy of postmodernism has emphasized the contextual construction of meaning and validity of multiple perspectives, with its key ideas being the following: knowledge is construed by people and groups of people; reality is multi-perspective; truth is grounded on everyday life and social relations; life is a text; thinking is an act of interpretation; facts and values are inseparable; science and all other human activities are based on value (Gojkov, 2007, p. 123).

In its normative dimension, postmodernism demands a reflected relation to pluralism and tolerance (Zimmerli, as cited in Gojkov, 2007, p. 114). Pluralistic tolerance does not mean that everything is all right and should be accepted – such a concept is rather unethical and undemocratic. Pluralistic tolerance is nurtured through familiarization with

heterogeneity of the types of discourses and language games. As a consequence, the today task is to accept the fact and develop an ability to fight for one's own beliefs without using violence; in other words, to learn to live with more or less permanent disagreement and contradiction. This seems to be more important than reaching a high and certainly sublime ideal of a subject searching for a consensus rational argumentation – an ideal reached by very few, anyway. The development of an ability to endure disagreement is closely related to the insight that there is always a lack of information and knowledge, which is connected to individual and often painful experiences of being stuck with helpless, hopeless and insufficient arguments. To focus on complexity, discontinuity and differences in school and teaching might lead to postmodern modesty – modesty that bids farewell to modern belief that there are rational solutions to any problem and that there is a higher sense and a meaning in each difference (Gojkov & Stojanovic, 2011, p. 289). All this refers to the search for the teaching methods to guide young people towards the above described abilities. Therefore we are searching for new methods of instructions; discourse as a method of instruction seems to be appropriate, especially in higher education teaching where learning contents should involve open questions, controversy issues suitable for self-organized learning and discussions on arguments in favour of the standpoints the students have adopted.

There are various approaches to understanding of emancipatory upbringing (Koenig et al., as cited in Gojkov, 2007, p. 201) and we cannot deal with them here, but a fact should be mentioned that they all have the same the same determinants whose essence is in the following: critical attitude towards reality which is to be changed; liberation from repression and emancipation of an individual; autonomy, self-determination and solidarity; learning through communication and interaction in teaching where students and teachers cooperate. It seems that all this can be encouraged by previously defined characteristics of a discourse as a method of instruction at higher education level, contextualized within meta-theoretical field grounded on critical philosophy of society and emancipatory didactics.

3. Methodological framework

Research is of exploratory character and its aim is to consider the effects of the implementation of new concepts of higher education didactics, after the implementation of the Bologna declaration principles, with the method of discourse being one of them; in other words, efforts have been made to get an answer to the question referring to the extent learning styles influence the acceptance of discourse method, thus indirectly leading to an answer to the question: to what an extent learning styles, i.e. some of their characteristics are encouraging or disturbing in participatory approach to learning. The underlying question is to what an extent discourse method, i.e. its efficacy depends on learning styles and the formed learning strategies. As a consequence, we could get to the answer to the question referring to the possibilities and effects of application of a discourse as a teaching method in higher education teaching. The basic question could be formulated as follows: what is the relation between learning styles and student's reactions to discourse method and what is the level of their correspondence? The question has actually tested the thesis on the influence of learning styles on the acceptance of discourse as a method in higher education teaching and what has been considered is the efficacy of discourse method, its motivational and cognitive aspect, leading to the insights into the ways higher education didactics tries to give its contribution to more comprehensive self-observation and self-reflective, self-managed learning towards self-changes that would ensure freedom of person's actions according to contemporary philosophical discussions leading to the creation of competences expected in working and social context today.

Working hypotheses are as follows:

- the characteristics of cognitive and learning styles of students correlate with the content with discourse as a teaching method within higher education teaching; characteristics of learning styles classified under meta-components (Sternberg's triarchic model of view on abilities) are connected to positive opinions on discourse method.
- cognitive and learning styles of students significantly correlate with cognitive reactions of students within discourse.

In such a way it has been considered how students assess discourse as a method of instruction, aiming at obtaining the evaluation of the effects of discourse as a method of instruction; thus the essence of qualitative changes introduced by the Bologna process would also be evaluated, identifying an indicator which would in a sense mark the culture of quality of learning. The effects of the implementation of the method have been considered from two angles. One refers to the aspect of students' acceptance and it is considered according to the statements given by students showing their satisfaction with participation in the discourse, i.e. their assessment of this teaching method. The other angle is considered through cognitive reactions of students in learning and teaching situations observed in the discourse (reflecting cognition elements relevant for creative approaches to problem solving, flexible, creative, non-dogmatic thinking, as well as ability to accept pluralism of ideas; in affective sense they refer to the ability to tolerate suspense and uncertainty, and in connotative sense, the abilities refer to taking the initiative, innovativeness and risk-taking readiness).

The mentioned hypotheses fit into the basic concept of elements of theoretical research approach and are based on the belief that through emancipatory didactics and participatory learning which are in this case embodied in the method of discourse students have a chance to develop features according to which they will be able to learn in a way implying self-determined, self-responsible learning. The reason for choosing discourse method refers to my modest assessment that it could provide solid chances for manifestation and practising of features leading to emancipation in learning process within higher education teaching. This should be in accordance with the character of theoretical context to offer an insight into motivation of students, their learning strategies and the level of development of meta-components expected to be developed at this age, as well as learning styles which should be in function of self-development, intrinsic motivation, meta-components and, before all, performances efficacy. Therefore it is expected for learning styles to be in correlation with the acceptance of discourse method.

Research was carried out during the summer term of the academic 2010/11 year and the winter term of 2011/12 year within the course *Didactics* at the second year of the Teacher Training Faculty and the course *Methodology of Pedagogic Research* at the third year. From organizational point of view, students were offered to deal with certain themes according to the method of discourse; i.e. this was seen as a pre-exam obligation and was recognized through certain number of points to be a component of the final mark. The themes for the discourse were given in advance, as well as provisional literature for preparation, while during the classes the discourse was led according to questions and problems; argumentation was provided from the anticipated, as well as other sources students found themselves. The evaluation was carried out after each class, expressed by the anticipated number of points. The students were familiar with the ways of evaluation. During their engagement their cognitive reactions were assessed in accordance with the demands of emancipatory didactic, as it has already been mentioned in the previous text (observation protocol, construed for the purpose – PPKR). All the reactions were registered and scored relying on the classification closest to Bloom's taxonomy, with a difference that the highest score was assigned to the creative reactions of students which are in accordance with the theoretical framework of emancipatory didactics, i.e. with the theoretical grounds the paper starts from.

Having completed the two courses, a questionnaire was administered according to which students should express their level of satisfaction with this method of instruction, i.e. they were asked what they think of the method of discourse, to what an extent it suits them, i.e. how satisfied they are with it (the questionnaire – ZDMPVN – was designed for the purpose of the research and refers to the following questions: what do you think of a discourse as an instruction method in higher education teaching; what is it that makes you content with such a way of work, and another question was: what would you like to change?). So, the questions were of open type and students stated their standpoints and opinions on a discourse. The subjects were not asked to evaluate the procedures within a discourse and they were not limited in any way; consequently the evaluations involved both positive and negative assessments, as well as recommendations for further modification of the method. Such an approach was chosen, before all, due to the advantage the freedom of expression implicitly involves. In order to establish the type of cognitive style, a battery of cognitive style tests has been used – consisting of 28 tests, i.e. 120 tasks, classified in five groups, according to cognitive style types (divergent, convergent, analytical, field dependence-independence, imaginative...).

The research was undertaken on the sample of 564 students. The non-probability sampling technique was used, i.e. the sample was random including 58% of 2nd year students, and the rest of them were 3rd year students.

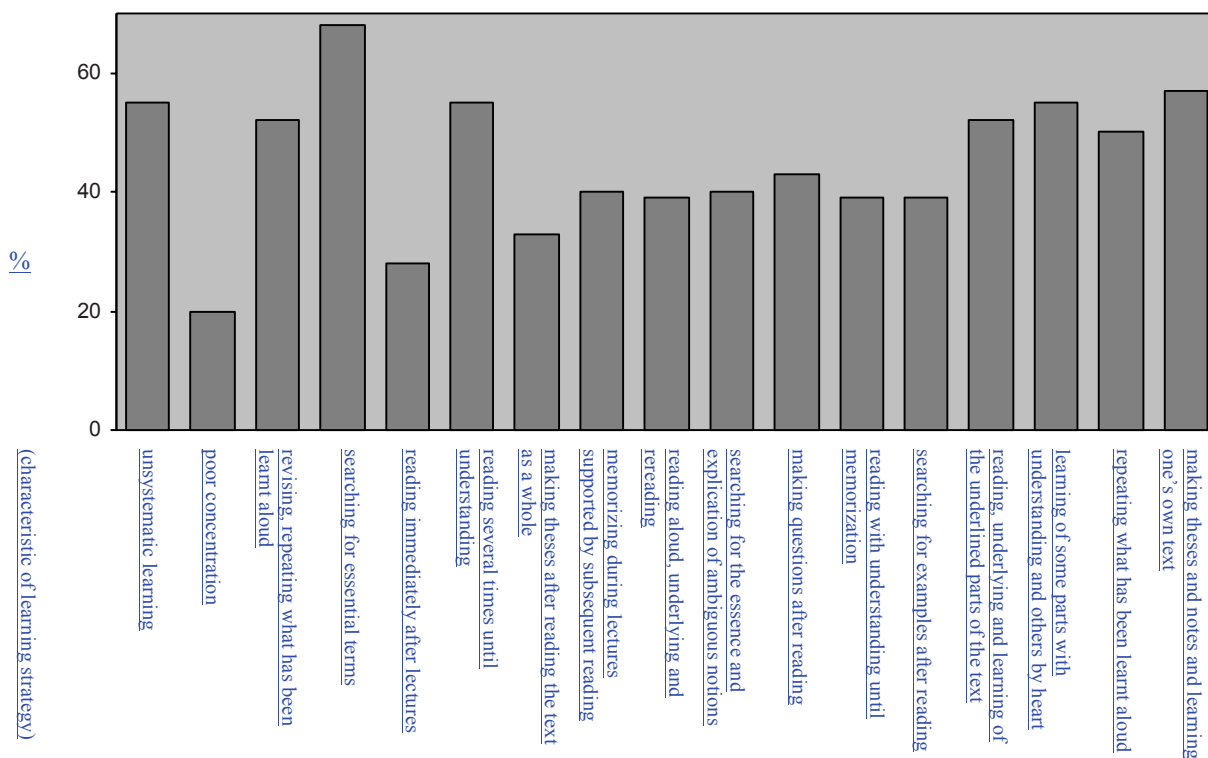
The independent variable is a discourse as a method of instruction in higher education teaching, and the dependent variables refer to the following: satisfaction with the discourse; cognitive reactions of students; success expressed by the number of points. The method of systematic non-experimental observation was used in the research. Factor description of cognitive style and learning styles has been used as a statistical procedure. Reliability of the battery has been assessed by “alpha” coefficient. Equivalence of participation of the parts of the battery in the measurement of cognitive style has been investigated according to the same coefficient. Cronbach correlation coefficient, or, the so called alpha coefficient is 0,741, considered to be of high reliability at the level 0,01. Subtests, of course, have lower, but satisfactory level of reliability. Discriminateness of subtests has been undertaken according to χ^2 test. Subtests measuring analytic-non-analytic and imaginative cognitive style are discriminatory at the level of 0,01. On the other hand, those related to divergent and convergent style have not satisfied relevance level. Discriminateness has been present, but in a milder form (relevance level 0,1) in the case of subtests measuring the dependence-independence of a field. The validity of the battery on the whole and cognitive style subtests has been established according to point bi-serial correlation coefficient and factor analysis. Validity coefficient is 0,799, i.e. the composite validity of the battery is high. High communalities in factor analysis, as well as the parts of the variance and co-variance of battery parts are indicators of a sound internal consistency of the battery, which is an indicator of battery validity. The link between the set of variables referring to aspects of content with discourse and a number of points was investigated according to the *non-linear canonical correlation analysis*, stepwise method; factor analysis of the aspects of satisfaction with a discourse was carried out according to Categorical Principal Components Analysis method; Factor analysis of the reactions appearing within a discourse was carried out according to Categorical Principal Components Analysis method; the link between the set of variables referring to cognitive and learning style and the set of variables referring to the reactions in the discourse was studied according to the canonical correlation analysis; hierarchical cluster analysis of the variables from the domain of satisfaction with a discourse was carried out through the between-groups linkage method; the hierarchical cluster analysis of the variables from the domain of reactions appearing in a discourse was done in the same way, i.e. using the method of between-groups linkage. Quadrate Euclidian Distance was used as a cluster distance measure.

4. Findings and interpretation

4.1. Learning styles and cognitive styles

The characteristics of the learning styles of students were first to draw attention. The [Figure 1](#) offers a simple, yet a clear outline of the finding. Referring to the identified characteristics of learning style, the [Figure 1](#) shows that the most frequently manifested is learning that takes place through repetition and revision to memorization. It could be said that the largest number of students stated repeating one's lessons and revision as characteristics of their learning styles. These are followed by learning according to notes the students make from the material they are supposed to learn, which they learn through repeating. If repeating one's lessons was classified under the same category including making notes and learning one's own text; it could be said that almost majority of students do not learn reading a whole text; they rather try to memorize shortened versions they made themselves. This would not have to always have negative connotations if we were not to face the fact in examination situations that these digested versions were actually not always what the essence of the text was, and what is even more disturbing, that it was not learnt with understanding.

Figure 1. The presence of certain learning style characteristics



What is also easily noticeable is poor concentration (18,1%). It is significant since it is perceived as a problem and a disturbing factor in learning by students. Furthermore, it is easily noticeable that reading after lectures, classifying notions, etc. is absent in majority of students (74,6%).

4.2. Cognitive style dimensions

Factor analysis has extracted 8 factors which mostly refer to creative aspects of learning approach, which had been looked after by the battery examining cognitive style, since these are the cognitive reactions being the essence of emancipatory approach to problem solving and learning in general. Communalities as parts of variance are rather high, leading to a conclusion that the shared part of the variance of the observed variables is the same, i.e. that the basis of the observed variables is common. So, different tasks are interwoven by similar cognitive processes. This is a confirmation of the internal consistency of the battery used to confirm a cognitive style, as well as an indicator of the validity of instruments. The extracted factors were named according to abilities they defined: 1. *independence*, 2. *attention selection*, 3. *unconventional reinterpretation*, 4. *convergent production*, 5. *flexible control*, 6. *divergent production*, 7. *imagination*, 8. *creative generalization*, 9. *tolerance to disharmony*. Cognitive style of the subjects differs individually depending on the intensity of manifestation of certain cognitive characteristics, i.e. what characterizes these dimensions (i.e. factors) of cognitive style. However, cluster analysis has shown tendencies of groupings according to similarities of cognitive functioning. As a structure, cognitive style tries to give framework to differences, so that similarities are manifested in the form of domination of significant characteristics of perception, thinking...

4.3. Students' opinions on discourse

Figure 2 shows that the frequencies of the presence of students' opinions are almost equally distributed; they are equally present in the case of more than a half of the subjects. The opinion present with significantly lower frequency refers to "it is uncomfortable to discuss in a group"; on the other hand, it is present in the case of 36% of subjects, which is not irrelevant from the view of the acceptance of discourse method.

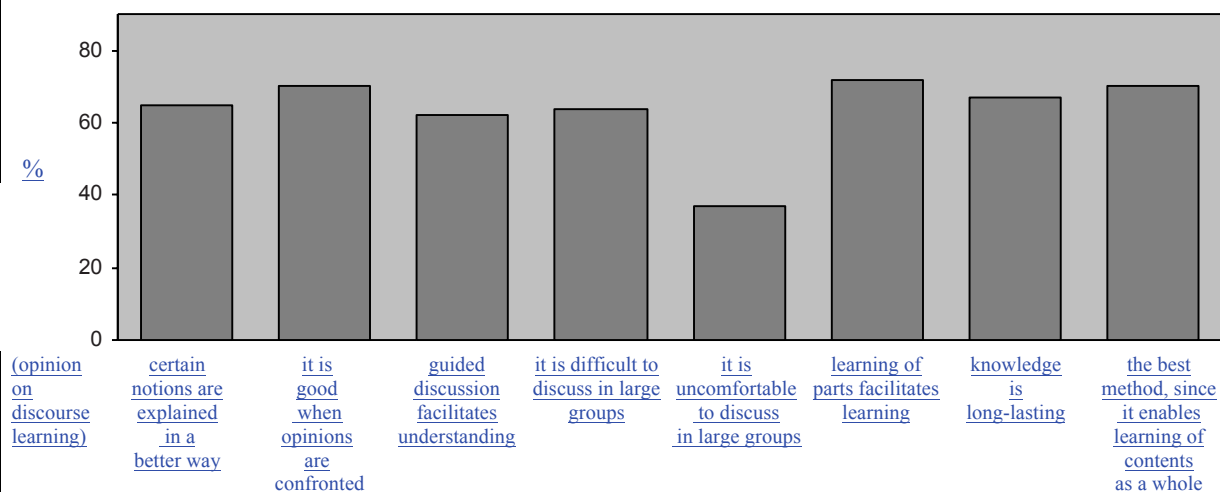


Figure 2. Percentages of subjects with certain opinion on discourse present

4.4. Cognitive and learning styles and students' opinions on the method of discourse

The link between the set of variables referring to cognitive and learning styles and the set of variables referring to the opinions of students on discourse was investigated according to the *non-linear canonical correlation analysis*, having in mind that the variables in both sets are categorical. Optimal scaling of all variables to single nominal level was carried out in the analysis. It turned out that the solution with two dimensions is optimal. A summary of the analysis points out that the losses are not significant, for the first dimension being around 15% and for the second around 20%. The Eigenvalue of the dimensions imply the connection between the two set covered by a dimension. In our case, the first dimension covers 85% of the link between the two sets and the second 80% of the same link. This leads to the finding that the explained variance is rather high. The canonical correlation, which for the first dimension is 0,7, and for all other dimensions the canonical correlation is 0,6 implies that there is a high level of connectedness between cognitive and learning styles and the opinions of the students on discourse, confirming the basic hypothesis of the research and pointing to the possibility to make a conclusion that the content with the discourse as a teaching method in higher education teaching depends on the characteristics of cognitive and learning styles of students, permeating the opinion of students on discourse method. Conclusions on the working hypothesis will be made according to the considerations on the burdening of the variables scaled according to certain dimensions.

Burdening of the variables scaled according to certain dimensions, i.e. defining of dimensions, has shown that the first dimension is defined by the *strategy of making notes and learning one's own text*, the presence of the *opinion that it is uncomfortable to discuss in a larger group* and the absence of the *opinion that learning of parts facilitates consideration of the teaching contents*. The second dimension is defined by *poor concentration, search for essential terms, learning of some parts with understanding and others by heart*, the absence of the *opinion that it is good to*

confront standpoints and the absence of the *opinion that more long-lasting knowledge is acquired through the discourse method*.

The first dimension leads to a conclusion that those students who feel uncomfortable to discuss in a group, i.e. they have negative reactions to this teaching method and consequently do not take part in the discussion, have dominantly expressed characteristics of learning style and learning strategies oriented towards the abstracting the text to be learnt, they make shorter notes and learn their own text; such a text, as it could be concluded according to experience, does not include the broadness of the teaching material, it does not allow linking of the contents, does not allow analyses, syntheses, generalizations, etc. It seems that these strategies and their learning style as a whole are reduced to the preparation of the shortened versions that are learnt almost by heart – the effects are poor understanding of the teaching material as a whole, impossibility to use what has been learnt in other contexts... In regard to the working hypothesis, this finding talks about the motivation of students during learning. Unfortunately, the thesis on intrinsic motivation *has gone up in smoke* at the very first step. Unfortunately, what remains is a statement that learning styles of the subjects show that the students do not have intrinsic motivation, and that not even the discourse method, as it would be likely to expect, did not succeed in awakening the intrinsic motivation in the case of the students. In other words, students learn for exams, i.e. in order to get more points and higher marks. The confirmation of the statement can be found in the second dimension defined by *poor concentration, learning of some parts with understanding and others by heart* and *search for essential terms*. The definition of the dimension involves the absence of the standpoint of positive feature of opposition of opinions in a discourse, as well as the standpoint that long-lasting knowledge is not acquired through the discourse method. This leads to a conclusion that the variables defining the dimension in its grounds have the learning style that could be labelled as learning from notes and abstracts both with understanding and by heart. This learning style is related to the stated negative opinions on discourse.

The above stated outcomes lead to a conclusion that the characteristics of the learning style according to abstracted texts are not grounded on meta-component (Sternberg's triarchic model of understanding of abilities), i.e. learning is not guided by the strategies facilitating creation of a mental frame using organization of knowledge into patterns, systems; it does not enable long-lasting memory, since it is dominated by the methods of mechanical memorizing, i.e. learning contents are not organized meaningfully (similarities and differences are not noticed, the relations with the related terms and notions are not discussed...). Gathering, classification and processing of data supporting metacognition and meta-memory are not present to the expected extent; thus the processes of evaluation of one's own strategies boil down to considerations of input and output. According to the details on strategies and learning styles it could be seen that other factors also had a significant role to play – for example, prior knowledge (a large number of terms is missing, leading to difficult understanding of the contents...).

Due to the limited space here the graphs showing these findings are omitted and only the comments are offered. So, Search for the essence and I feel uncomfortable discussing in a group have the same direction, as well as learning of underlined text and repeating aloud what has been learnt, etc, leading to a conclusion that these variables make a subcategory, i.e. a type of learning style which also could not be classified under those that contribute to emancipatory learning, marked by metacognitive approaches or driven by intrinsic motivation. The same group includes the variable large groups make it difficult to discuss, but the same students consider that discourse facilitates understanding thus showing that those who have not expressed positive opinion on the discourse nevertheless assessed it positively from the angle of facilitating understanding of the contents and long-lasting knowledge. In other words, the students are aware of the advantages of learning through the method of discourse, but they have limiting factors preventing them successfully participate in it (the adopted strategies of learning by heart, learning according to notes, prior poor knowledge...). It might be concluded that the graphs are more clear picture of the previous finding, refuting the working hypothesis, thus indirectly confirming the conclusion that meta-component do not come into play in the learning styles of the subjects.

According to the graphs showing variables it can be seen that variables form 5 sets defining certain learning styles that, on the other hand, more or less correspond to the variables defining students' opinion on discourse method. According to the sets of variables and their interrelations expressed in the canonical analysis, it can be seen that the types of learning styles are classified according to their frequency, so that: 1. the first is careless, superficial,

students learn to memorize, often without understanding, they learn by heart while the opinion on discourse as a method is not positive, even though the students have made some positive reactions. The second set reflects learning notes, i.e. abstracts of the texts, the third understanding during lectures with additional reading and making thesis, the fourth searches for the essence and understanding – it is directed towards meaningful style with the best reactions of students to the method of discourse and the fifth could be classified under mechanical. The graphs that are not given in the text due to the limited space show centroids of the categories (mean group values) defining the mentioned two dimensions represented the direction between the variables more clearly, i.e. they are the graphic expression of canonical analysis. It can be noticed that within the set referring to learning strategies the following variables have the same directions of categories: unsystematic learning, repeating, search for essential terms, reading immediately after lectures, reading until understanding, reading until memorizing, search for examples, underlining and reading of the underlined text, learning some parts with understanding and others by heart, and revising and repeating what has been learnt. In the set referring to the opinion on discourse the following variables have the same direction of categories (from the bottom left quadrate to the top right quadrate): guiding the discussion in such a way that it facilitates learning and large groups make it difficult to express oneself. Furthermore, it can be noticed that those subjects considering that guiding the discussion in such a way that it facilitates learning and large groups make it difficult to express oneself do not use the following strategies: search for examples, learning of the underlined texts and repeating aloud. Something else is characteristic for their strategies: unsystematic learning, poor concentration, search for essential notions, reading immediately after lectures, reading until understanding and memorising, learning some parts with understanding and others by heart.

The graphs also show the variables that have opposite direction. In the set of learning strategies these variables are the following: making notes and thesis after reading, memorizing during lectures and additional reading, search for the essence and making questions after reading; in the set of cognitive style the are: independence, attention selection, unconventional re-interpretation, convergent production, flexible control, divergent production, imagination, creative generalization and disharmony tolerance. In the set opinion on discourse the following variables have the same direction: it is good when opinions and standpoints are opposed and exchanged, learning of parts facilitates acquisition of the content material and enables comprehensive acquisition, opens up possibilities for one's own interpretations, different views, linkage from various angles...

This has been confirmed according to cluster analysis. Hierarchical cluster analysis of learning styles and opinions of the discourse has been undertaken in 24 stages according to the method between-groups linkage. Euclidean quadrate distance was used as a measure of distance between the clusters. As an illustration, we will only state that the dendrogram shows that the students who express satisfaction with a discourse form sets including the possibilities of exploration, independence, freedom, etc, manifesting success in the form of creative cognitive reactions: independence, attention selection, unconventional re-interpretation, convergent production, flexible control, divergent production, imagination, creative generalization and disharmony tolerance.

5. Conclusion

What can be concluded according to the findings and their brief interpretations is that the correspondence between cognitive and learning styles (and as it has turned out within them as well), learning strategies and the method of discourse entertains significant influence on self-reflexive and self-managed learning of students, which is an indicator of the importance of the method of discourse within higher education teaching. The fact that discourse is permeated with participatory approach is a reason for the manifested satisfaction of the majority of students; such a finding confirms the ideas of participatory epistemology in the approaches to learning and opens a path to encouragement of autonomy and self-regulated learning, as basic elements of emancipatory didactics and cognitive functioning which should be characterised by flexibility, creativity, risk-taking readiness...

Such a finding undisputedly emphasizes the importance of application of those teaching methods that encourage more creative approaches to learning of students; furthermore, the findings lead to a conclusion that it is necessary to introduce individualization of approaches, having in mind that the method of discourse has not been accepted by

all the students in the same way and to the same degree. Another implication is also important – the number of students in groups should be lower.

The students who have expressed satisfaction with discourse have the cognitive reactions in teaching and learning situations observed within the discourse (creative approaches to problem solving, creative, non-dogmatic thinking in the discussions dealing with the discussed matters, openness for different ideas; they are tolerant to uncertainty, initiative and consider various matters from new angles, manifest risk-taking readiness). What remains as a conclusion is that there is a group of students unambiguously identified as those who express satisfaction with a discourse due to possibility to explore, be independent, free, etc. and that they were actually those who manifested success in the form of creative and cognitive reactions. This could further mean that a discourse as a method of instruction suits them best and that other students need additional work in order to adopt strategies implied by participatory epistemology and get closer to emancipatory aims of learning in higher education teaching, having in mind that self-organized learning leading to autonomy is not present in the majority of students. Students whose learning styles do not include reading a text as a whole, raising questions after reading, making synthesis, comparing to other ideas, positioning into real context – finding examples, search for better ways of contents presentation, re-grouping of ideas, wandering how to find an easier way to solve a problem and learn something, critical reconsideration, evaluation of their own strategies have neither developed metacognitive component nor intrinsic motivation (they learn to earn points and good marks, according to sketches, notes and in some cases even by heart). Students who are not used to self-organized learning, searching for answers, raising questions and providing arguments supporting them, actually feel uncomfortable in group discussions; in other words the method was not acceptable for them. This leads to a conclusion that realization of the ideas of the Bologna process has a chance in essential didactical-methodological innovations of learning approach, taking into consideration those complex cognitive structures like cognitive style.

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