Teacher activity versus complex cognitive processes

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Abstract: The prepared text will attempt to present the functioning of the teacher at an extremely rapid time of modern change. Complex cognitive processes, i.e. imagination, thinking and language, play an important role in it. Each teacher has the imagination and thinking to realize an idea connected with the selection of the content of the subject, the realization of the tasks provided for in the curriculum in order to perform them in the form of products. The cognitive processes analysed support teachers' professionalism and help to design educational challenges, building a system of motivation, knowledge and skills of the learning partners. These elements make up language, which has an executive function, including planning as well as organizing messages, and expressive functions - speaking, writing, drawing, gestures ect. Knowledge of the language functions allows the teacher to make good and creative use of pedagogical teaching methods and visualisation of information. Therefore, the value of the teacher's activity will be demonstrated through practical solutions to draft academic teaching tasks. In this way, the teacher's routine duties will be enhanced by creativity, which can become a source of further educational inspiration.

Keywords; teacher, activity, cognitive processes, creativity, visualisation of task solutions.

1. INTRODUCTION

Modern times do not only offer rapid changes, but also a clear way of functioning for people in terms of their behaviour, thinking and seeking more effective procedures for keeping up with reality. However, transformations in school and teacher activity are undertaken with varying frequency. It adapts to approved modifications and the

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strategy chosen by the educational institution. This diversity of Polish education and the teacher is conditioned, among others, by the Prussian educational model [1], which was useful in the industrial era. Nowadays, the past destroys the ideals of ingenuity, creativity and activity, which previously proved to be useful.

The present environment is transforming, as is the work of the school and the teacher. Albert Einstein noted this correctness and wrote: "the highest level of educational skills is the art of awakening in an adult pupil to creativity, using simple didactic aids" [2]. This original scientist's idea quoted here reflects the adaptation to the dynamically modernizing environment in which the teacher comes to fulfil professional duties. S/He should easily cross the boundaries between the real world and his/her inner world in order to use the accumulated resources and cognitive processes. Clear, efficient and rational use of the teacher's complex cognitive processes can be the right key to the activity. And individual commitment is a spark for team-based school activities and innovation.

2. Terminological complexities

It is difficult not to talk about activity and multiple teaching duties that require proper concentration of the potential inherent in internal cognitive processes. They give an impulse for the construction and transformation of cognitive structures formed in the teacher's mind, and become the subject of research into cognitive science and cognitive psychology [3].

Thinking and language are most often mentioned among complex cognitive processes. Tadeusz Maruszewski adds imagination. In his opinion, it is "the ability to anticipate, complete and reproduce facts, phenomena, things, and the ability to present something not seen before to oneself according to one's own will, situations, persons, objects, etc." [4]. A similar term can be found in the work by Alan R.White, who wrote that "Imagination is generally conceded to be the ability or action of the mind or heart to form new ideas, images, or concepts not present to the external senses of sight, sound, taste, touch, or hearing" [5].

James W. McAllister referred to Shaflesbury's thought that in the process of thinking there is "pleasure" that reveals something [6]. This coincides with the scientific view that cognitive functions are marked by the emotions that drive the creation of ideas that are referred to as "cognitive adrenaline"[6]. It allows to understand ambiguous educational facts or events. The leading role is played by the teacher's perception mediating in the acquisition of material data. Elaboration thereof

depends on the thinking, imagination and pleasure experienced by the teacher. The realisation of sensual operations contributes to the realisation of school tasks, both schematic and alternative ones containing a project. There, various contents of a given subject can be combined, including academic ones. The implementation of activities and tasks provided for in the curriculum or research plan includes the generation of products, as well as the collection of documents indicating uneven levels of teacher activity, in which imagination plays an important role.

The fundamental element of imagination is the process of perception. It consists in creating a representation of the subject on the basis of information received from sensory organs and information contained in a person's memory. It is an image of all available traits registered through the senses that merge impressions, which involve the perception of many traits at once, as Edward Necka writes [7]. Images are less accurate, but we recall them at any time. They depend on the external object that we imagine after having recorded it in the memory. Imagination facilitates thinking, remembering and storing information. They all support the reproduction of messages, perceived objects, and other phenomena. Hence, thinking is "(...) a process of combining elements of the cognitive representation of the world into longer sequences, replacing real behaviour observable in reality in the physical or social world, freeing us from the need for immediate effects of actions" [8].

Some scientists such as Maria Lewicka are convinced that "(...) going down the road to a specific result of solving a task only symbolizes some form of thinking taking place in cognitive structures" [9]. Other theoretical psychological trends consider concrete, logical, formal, post-formal and abstract thinking [10]. Regardless of the kind of thinking that dominates the teacher, it should be stated that "the habits of thinking are characterized by a reductionist tendency to find in the current situation elements common to those that were experienced before and to apply solutions that worked in the past (...). There is a fixation (...) to cross (...) acceptable limits" [11]. It is encountered in many areas of human activity expressed in both a symbolic and abstract form.

The properties distinguished can be attributed to language [12], as a means of understanding. It contains signs, rules, meaning and grammatical functions. It is a projection of the human inner world and is enriched with the development of complex cognitive processes that differ in the spatial interval. It includes regional and professional dialects, and fits into the social structure. By the way, they reveal the

executive and expressive functions of language. Its characteristic sound can be heard during a teacher's meeting with other people, who are at the same time "the sender and the recipient of messages, characterized by phonicality, i.e. specific sound and alphabet, (...), having an abstract (remote) character; referring to general notions and talking about absent phenomena, having a polysemic character, i.e. a property indicating the creativity of language, showing self-maneuverability, speaking with the use of language about the language itself and abuse including good and bad information" [13].

These properties are taught by each individual at different stages of the teaching activity. There is a need to present the collected information, but also to design and arrange it into solutions to specific school tasks. Understanding the command given with the help of known linguistic tools assigns elements of the text to the elements of the environment. Therefore, knowledge of a language is as much as being able to decipher and explain the information contained therein to oneself and others. Often, as a result of various noises and obstacles in education, learning partners can interpret this linguistic projection of reality individually. This becomes the cause of interference and disruption of information with similar or different signs and rules. The difficulties indicated are encountered by the teacher, who should know their value and strength.

The global changes that are noticeable all over the world affect the teacher, his or her language and cognitive processes. They are a strategic tool for discovering new things and learning again. We learn both what is a weakness and what is an asset. The words of Leonardo da Vinci, who expressed the conviction that "our knowledge begins with what we feel, we experience without exhausting our minds" are significant [14].

The teacher's mind gains knowledge of the surrounding world from the process of reducing or supplementing data from its cognitive structures by actively reproducing the external object. Tactics and dexterity allow for a variety of ways that can be categorized and referred to as "performing calculations and arithmetic operations, abstracting, creating concepts, formulating judgments, making decisions, organizing and planning, and solving problems" [15]. A person with a complex recording apparatus has the possibility to arrange new ideas or solutions. In the era of modern technology and digitisation, limited access to the full use of cognitive processes is observed [16], but on the other hand, the inability to exploit Internet

resources gives rise to social exclusion and brings an individual to the margins. In this situation, the teacher must be active. He/she has to think, design and appropriately visualise the perceived real and virtual objects, phenomena, in order to participate in building the school reality and understand what is already there and what can be created in the future.

Support for teachers' activities

The school and its activities depend on many factors. The first one is the teacher, the qualifications gained and the skills formed over the years. He or she realizes that professional preparation is also the result of the right combination of data perception and cognitive processes. Since ancient times, their mature character has been identified with achievements of science. Its causative value is accumulated through human experience and learning about undefined logos. The reason is the lack of direct access of the mind to the material world. For this reason, it uses cognitive processes and operations to "tune higher processes to improve predictions. Satisfaction comes from surprise and the discovery of the mismatch between prediction and input material, as well as from the fact of learning" [17]. Current learning processes include visualisation and the principle of isolating and integrating elements from the environment, as well as the principle of visual metamorphosis integrating different elements in order to extract their meaning. Acquired potential and professionalism supports the educated and effective principles of observing and recording school activities by the teacher by revealing the "visual thinking" described by Neisser Arnheim [18].

This gives greater opportunities to visualize everyday activities by overcoming weaknesses, by supporting them with a variety of factors that allow for apt use of cognitive processes when exploiting teachers' professionalism.

Project method and visualization - active shaping of the teacher's senses

The teaching profession is not only a duty and work, but also a practical and creative art of discovering new things. It requires seeing the relationship between the information recorded in the linguistic character code and its use to solve tasks from a given subject. The teacher's idea of learning about knowledge and the world must be taken into account, as well as a vision of sorting and classifying the messages leading to their uniform development. At each stage the language of symbols and images appears, which in the end takes the form of a result and/or a product with a real and visual shape. This visual representation of the analyzed and deciphered fact

or phenomenon is initially a concept within the cognitive structures giving a real object or solution that it evaluates [19].

The interest in gaining knowledge and activating educational partners with the use of cognitive processes has become the foundation of the project method. Its creator was William H. Kilpatrick [20]. He saw the independence of the realization of the chosen school project, for which information is necessary, shaping various intellectual and social skills. As Wacław Strykowski notes, the unique features of 'the project is; orientation towards the pupil, towards reality and towards the product, where the work results in the final product' [21].

The project emphasizes individual as well as team achievements, integration and extension of issues not only from one subject, but also from other subjects, verification of hypotheses based on the source base, selection of information, preparation of presentations in an original way, division of work and involvement, motivation and activation, sense of responsibility for oneself and others. The teacher takes a clearly different attitude here. He or she is not only a professional, but also an advisor and a person who stimulates pupils' creativity, expression and dynamism. Mutual dependence was captured by Aristotle, who stated that the mind achieves perfection thanks to the constant knowledge one acquires [22]. Thus, the project method arranges holistic teaching with an interdisciplinary character. Due to its specificity, the process of controlling and evaluating the result in the form of a product includes a discussion about where the participants show specific skills and knowledge. What is important is the teacher's ability to motivate students to do the proposed activity, blurring the gap between mental and physical effort.

The undertaken activity may be supported by a type of visualisation including a photograph which will illustrate the linguistic code contained in the subject. It embraces information about external conditions, time of creation, context, facts, phenomena and situations of the subject, which are considered from the point of view of the observer and interpreter of the content. According to Krzysztof Konecki, "(...) interpretation can take place on many levels and dimensions. The first is the aesthetic dimension concerning the presented object (...).The second is the sociopsychological dimension (...) where we are interested in people's motives and definitions of their situations. The third is historical and contextual, where the idiographic aspect is synthesized with the nomothetical(...).The fourth(...) is the cultural dimension(...). The fifth is a purely social dimension (...) being an extension

or prosthesis of human memory" [22]. Initially, it is born in the mind, as is the method of projection, so that in the future the image and the things and information seen will materialise in the product.

Moreover, the author wrote that photography can be used to create the most important research strategies, where its (...) use presents specific objects of social importance for the analysis of materials found (...) with narrative verbal commentaries made by the respondents to the given photographs (...) or as an illustration to the conclusions obtained from the research (...)" [23].

The described strategies can be included in the teacher's project work steps. These will include:

- the initiation and preparation of the project; the selection of individuals or a team, the preparation of an instruction manual which includes ways of implementation and evaluation and the assistance of expert(s),

- selection of the subject resulting from the subject (also academic, which is general pedagogy) and clarification of general and specific objectives,

- Planning activities - which are the most difficult step, because it is necessary to determine the material resources, i.e. the information available and access to sources and intangibles - individual abilities and talents resulting from smoothly functioning cognitive processes, as well as the number and order of tasks, to make a list of specific problems, find a person to coordinate the organisation of activities, answer at a given stage what is done and what needs to be done, observe what activity the teacher undertakes as an expert and what students do, organize data, ideas and decisions made, and come up with solutions,

- implementation; it is good understanding of the content of the information contained in the subject, estimation of the activity of individuals or the team concerning the subject matter, summary of decisions on the idea for the solution, selection of the best idea included in the photographed product; brainstorming,

- presentation and evaluation of the product [24].

The above mentioned stages of the project including photographic visualization of the activity of the teacher and the participants can be summed up as follows: there is acceleration and operability of the cognitive structures in terms of progressiveness of the knowledge and skills possessed and acquired. This is in line with the education pillars of Jacques Delors relating to being, knowing, acting and learning together [25].

Participants and examples of good practice

The above considerations had provided the basis for planning the qualitative research [26] and practical actions. They were carried out in accordance with the above-described work strategy using the project method. Initially, all steps of the research procedure were developed in order to select participants on purpose. These were entrants to the art of teaching who had received their Master's degree at the Adam Mickiewicz University in Poznan in pre-school education and initial teaching. The main group of the respondents were women - 96 people (N=96), most of whom represented a small town - 55%, then a large town - 35% and a village - 10%. The presented distribution of the respondents confirms the feminisation of the teaching profession in Poland, especially at the stage of early childhood education.

The subject of verification was the recognition of the teacher's activity and his or her ability to use individual cognitive processes while designing solutions from the academic subject - general pedagogy. Therefore, the main goal was to use the project method and visualization as a teaching activity useful for assimilation and creation of new content in an original way thanks to concentration of cognitive processes. The topic of the task in the project method was the interpretation and understanding of the pedagogical content, which had to be presented with an idea. From the research material collected and the didactic classes conducted in the winter semester of the academic year 2019 /20, products in the form of photographs were collected. The individual and team activity of the respondents, i.e. the future teachers, revealed the use of the de Bono colourful hat method to better expose the pedagogical content. Below are sample photographs of the products.

Source; Photo archive of the author of the text.

Discussion and conclusion

The presented photographs show the diligence and unconventionality of the task performed by the entrants to the art of teaching. They worked out a topic covering the sources of creation of pedagogy considered in the following traditions: Pythagorean-Pallorean (white hat), Aristotelian (red hat), Archimedean-Euclidean (black hat), and the development of pedagogy in the European culture (yellow hat). In the respondents' opinion, the pictures above present the best solutions. Others were less original. Moreover, during the evaluation it was possible to realize that 68% of the future teachers processed the information effectively by analyzing the content of the pedagogical sources of the concepts, reproduced the information without any permanent notation, and 26% appreciated themselves and their predispositions with little interest in how the other members of the team worked.

The indicated stages in the project method and the quality of the developed information revealed sensible learning, based on internal cognitive processes overcoming difficulties in achieving the goal, i.e. preparation of the visualised product. The second type of learning, i.e. responsive learning [27], combined with rapid assistance by the expert(s), was seen. The intensity and nature of the teacher's reaction and his or her activity were an important component of the undertaken activity. There was both arousal and stagnation, which favoured either creativity or monotony, while also manifesting the teacher's work style. An immersive school environment is created that gives a concrete insight into internal and not directly observed processes. Through immersion, the teacher and his/her students can cross the boundaries of the real world and their own individual world to immerse themselves in an activity that is successful in education. They depend primarily on the person who has unprecedented dynamics and energy in exploring the environment and deepening knowledge. The support obtained in this area motivates the thoughtful use of each teacher's internal potential.

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