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Using the Method of the Concept Map in Higher Education of Adults

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Abstract

The variability of university education is influenced, among other things, by the fact that in addition to students at the initial stage of their education, teachers also educate professionally active adults. They should, therefore, know which teaching methods can be successfully used for the education of undergraduates and of professionally active learners, and when these two pedagogical situations differ so significantly that they need to be treated differently. In this spirit, it is also necessary to approach the choice of teaching methods. During our course of Engineering Education (designed for academics wishing to acquire or extend their pedagogical skills) the method of concept maps has proven itself. In our research, we investigated whether the teachers perceived the education (in the subjects of Pedagogy, Didactics, Psychology) in which the concept map method was used as more effective in terms of remembering the subject, understanding it and applying it in their own pedagogical activities in comparison to the method of lecture with presentation.

Keywords: teaching, learning, education, student, teacher, mental map, concept map

Introduction

The urgent need to streamline the educational process occurs cyclically; especially in break-through periods connected with social development and status of the economy. The same is true today, and there are expectations about the efficiency of the higher education that should be to some extent aligned with the education's process and results. When it comes to the abovementioned requirements, it is clear that an academic who works in a technical college of higher education needs an optimal pedagogical knowledge to enable them to optimize the organization and course of education, to take into account the specifics of

different types of studies, respecting age and learning styles of learners. Collectively, these skills are referred to as didactic competence.

Didactic competence is usually characterised as a set of skills that enable teachers to effectively perform pedagogical activities. Mužík (2004) includes, among others, the ability of the educator to manage the educational process in a sensible manner with regard to its complexity, to plan and use teaching resources, to activate and motivate the educated.

The level of didactic competence of a university teacher is influenced by the level of their knowledge of general and developmental psychology, the psychology of personality, adult psychology, social psychology, general pedagogy, social pedagogy, adult pedagogy, education theory, departmental didactics, didactics of adults and other disciplines. The list is not complete, however. How the teacher applies their knowledge to pedagogical activities is also influenced by their personality traits such as temperament, emotionality, empathy, the degree of creativity, optimism or pessimism, sense of responsibility, endeavour for self-improvement, etc. Didactic competencies are also reflected in the teacher's ability (skill) to understand the psychological, social and causal context of education, to appropriately conduct the examination and evaluation of the students with respect to their age and possible professional experience, and furthermore in a wide knowledge of teaching methods (Miklošiková, 2013).

Skalková (2007) argues that teaching methods are ways of deliberately organizing the activities of the teacher and the learners towards the set goals, Miklošiková (2009) considers them to be the procedures leading to the fulfillment of the educational goals and planned changes in the knowledge, skills and know-how of the students, while the extent of these changes demonstrates their effectiveness.

A university teacher should use different teaching methods during the course of education. The importance of such behaviour was emphasised, e.g. by Meirieu (1988) by pointing out the fact that students prefer different ways of receiving and processing information and learn unevenly, even if they work on the same task lead by a single educator. According to the author, this phenomenon is affected by sociological, cognitive and emotional factors, and the situation can only be resolved when no teaching method is dominant during the course. Teaching methods should be complementary and intertwined during the course of teaching, and the most appropriate combination should be considered by the teacher already during the scheduling process while respecting the following factors:

- the nature of the educational goal (whether it is knowledge, skills, key competencies or influence of attitudes?),
- the nature of teaching content (can activation methods be used?),
- the nature of the didactic form (direct frontal teaching, self-study),

- students' initial knowledge, level of their key competences and their social composition,
- the desired degree of activation of students,
- the learning process phase,
- spatial conditions,
- didactic and professional level of the university teacher (Malach, 2003).

When selecting a teaching method, the teacher should think about how to achieve students' active participation and how to develop their autonomy and creativity. Students of full-time forms of study, in contrast to students in combined forms, often need adequate pedagogical guidance, encouragement and incentive to learning activities. Not everyone is sufficiently mature and equipped with the necessary amount of motivation and willpower.

Mind and Concept Maps

The method of working with mind maps is an activating and relatively attractive teaching method that, among other things, develops the creativity of learners. A mind map can represent a procedure, a process or a conceptual structure. It can be used in decision-making, situation analyses, problem-solving, to develop creativity, etc. Buzzan (2007) considers the method a simple tool that effectively contributes to the organization of information and ideas, allows full concentration, affects memory functions, accelerates thinking, empowers flexibility, facilitates problem-solving and develops creativity. When creating mind maps, colours, curves, symbols and words can be used, which together contribute to the development of a well-organised and easy-to-remember scheme.

According to Čáp and Mareš (2007), the mind mapping method is particularly effective in studying more complex or larger learning areas, as it allows to create a knowledge scheme in which individual concepts have their place and importance, the teaching is not mentoring, and the lesson seems less demanding. The idea map methodology brings the following benefits to students:

- leads to activity and creativity,
- is an important device of self-regulation of learning,
- allows learners to perceive the learning substance in context and faster,
- leads to more permanent memory,
- teaches strategies of thinking,
- does not require precise definitions but lead to independent thinking and problem-solving thinking,
- can show the problem from different points of view,
- develops imagination and abstract thinking,
- leads to the formation of associations,
- with increasing knowledge, enables reconstruction of the curriculum,
- increases the speed and flexibility of thinking,
- can motivate,

- due to the use of pictures and colours, it affects the emotional area that plays an important role in learning,
- can be a suitable self-diagnostic tool.

The technique of mind maps also brings numerous advantages to teachers. Mind maps allow:

- easier planning of the lectures and structuring of the curriculum,
- more precise definition of main and auxiliary terms, ideas and definitions,
- more precise definition of study goals,
- more precise analysis of the basic concepts of the education process,
- more frequent use of creativity by the teacher and the students,
- reducing schematisation in teaching.

Conceptual mapping is based on Ausubel's (1963) assimilation theory, which relies on structuring and organizing the mental field of an individual. Concept maps are known, however, mainly because of Novak (2010), who dealt with the structuring of study materials. In his view, a conceptual map can be defined as a hierarchical structure of terms and relationships between them. Each term is in relation to one or more terms, and individual terms can be interconnected across hierarchies. In this case, their association is referred to as the vertical relationship. In concept maps, however, concepts in identical hierarchy also exist and these form horizontal relationships. Concept maps are commonly referred to as hierarchical, but there are other types, such as spider, progress, or cyclic concept maps. For reasons of clarity and comprehensibility, concept maps should respect some principles of effective graphic notation (Malčík, Nespěšný, 2017). In our survey, concept maps are considered a specific type of a mental map.

Research Methods

In the Engineering Pedagogy course, we applied the method of mind and concept maps in the following subjects: Psychology, Pedagogy and Didactics. We have alternated this teaching method with other methods, e.g. with the method of lecture using presentation with the explanation, interviews, etc. After the course, we have investigated, through an anonymous questionnaire, how the method of mind maps was evaluated by graduates of the course – university teachers working at the VŠB – Technical University of Ostrava; and which method they considered the most efficient in retrospective. In particular, they should comment on which of the learning methods was the most interesting from their point of view, the most activating, and most demanding from the point of view of their mental activities, and in which they learned the most. This is how we proceeded during two courses of Engineering Pedagogy in the years 2016–2018. After the completion of the course in both cases, a following questionnaire survey took place, which was attended by a total of 20 university teachers, graduates of the course by that time. We have received 20 positive responses in fa-

As can be seen from the following mental maps (Figures 1 and 2), participants of the course created their own diagram of the new information, differently graphically executed, with a different emphasis on superiority and subordination of terms. The first case represents a simple overview with colour marking of dependencies; the second case is a much more detailed representation of the subject without colour accentuation of relations. At this point, it should be noted that each student should create their own mind map.



Figure 2: Concept Map – Didactics

Conclusion

The matter of choosing suitable teaching methods with regard to the level and type of education, age, individual traits and learning styles of students – that requires university teachers to not only possess knowledge from relevant disciplines but also personal and learning experiences. These experiences were gained during the course, led by lecturers who sensitively and tactfully introduced them to the role of students. Experiential learning was used to help explain to the teachers, naturally but effectively, the ways which can be used to convey different types of information to students of formal education. One of the methods, which gained popularity among the pedagogues during the course of Engineering Education, was the method of the idea map. According to the opinions of university teachers of the VŠB - Technical University of Ostrava, it

is interesting to create a mind map; it leads to an easier and more permanent memorisation of the subject; facilitates the understanding of relations within the curriculum; helps with the application of the theoretical knowledge in practical activities; and supports and develops creativity. In any case, however, it is necessary to remember the rule that the mind map method is only effective as long as each student gets to create their own mind map.

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