

## Teaching Professional Technical Subjects Accepting Current Trends in Field Didactics

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### Abstract:

**Introduction:** In the theoretical study, the authors describe current approaches enriching the theory of field didactics concerning teaching technical subjects. They focus on developing the psychomotor dimension of students' personalities, which they consider to be an important part of the modern young generation's culture concept. In order to ensure this role in vocational-technical education, it is necessary to innovate the pedagogical preparation of teachers of technical subjects with a focus on achieving the required teaching competences. A part of the presented study deals with the determination, analysis, and representation of individual teaching competences in the doctoral study plan in the conditions of DTI University in Dubnica nad Váhom, Slovakia.

**Methods:** The theoretical study is based on a theoretical analysis of the issues of teaching technical subjects in vocational schools. For the purposes of theoretical analysis, the following research methods have been implemented:

- content analysis of the issues of teaching vocational subjects (current innovative trends in field didactics; theories of psychomotor learning; vocational subject teachers);
- logical operations (analysis, synthesis, comparison);
- generalization and recommendations for the school practice of field didactics.

**Results:** For the development of specialized didactics, it is necessary to take into account the newest results of scientific investigation in general didactics and field didactics; and to apply them in the existing and also

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new teacher training programs under development as only these facts create new possibilities for improving the quality of education in vocational schools. A consistent development of vocational subject teachers' teaching competences in the process of their preparation for the teaching profession following current trends and intentions in the field of didactics can become the carrier of positive changes.

**Discussion:** The authors of the study consider it extremely important to accept the latest trends in educational theory in the training programs for teachers of technical subjects. The result of this is the current doctoral study program offered by DTI University in Dubnica nad Váhom, Slovakia, which is organically linked to the master study program Teaching Technical Subjects. In the current academic year, DTI University has been granted the right to conduct habilitation and inauguration procedures in the field of study Didactics based on continuous and successful research activities in the above field with results comparable to the results at an international level and accepted by the professional international community.

**Conclusions:** In the conclusion, the authors of the theoretical study point out that a teacher developing students' personalities in all directions is the decisive factor in the educational process oriented on efficiency and high-quality results of students. To achieve this effect in the context of vocational schools, it is necessary to reform the training programs for future teachers of technical subjects.

**Key words:** general didactics, field didactics, technical subjects, trends in field didactics, psychomotor skills, teaching competences.

## **Introduction**

Vocational school teachers need to be equipped with a wide range of behavioural models, heuristic rules and best practices (Zelina, 2006), but, above all, they should teach well. In vocational schools, we often encounter situations when teachers do not teach properly. They have difficulties in communicating with students or evaluating their educational results (Čapek, 2015). We think that the above facts are directly related to the increasing number of apathetic, non-working, academically weak and undisciplined students.

Didactics is often underestimated in schools and, somehow, teachers have lost their interest in developing their skills in didactics. We do not claim that teachers in schools do not want to learn, but they prefer education in their vocational subjects. It is said that it is not the knowledge from a particular field which makes a good teacher, but his/her pedagogical-didactic skills.

In order to fulfil their basic task - which is to educate - teachers of vocational subjects must develop their students' personalities. They must possess deep knowledge from their fields, but in particular, they must receive good

pedagogical-didactic training. What can field didactics offer to vocational subject teachers?

In agreement with Podlahová (2012), we state that among the reasons for studying the theory of field didactics the following can be included:

- to succeed in a vocational school not only as an expert but also as a good teacher who can communicate subject knowledge to students;
- to increase self-esteem;
- to build the reputation of a good teacher;
- to get a sense of well-done work;
- to develop relationships with students as future professionals, with partners and colleagues;
- to facilitate students' understanding of the educational content and to manage their learning activities;
- to popularize their field in an accessible and comprehensible form;
- to clarify the key elements of the mediated educational content, the links, the system, and the importance of it;
- to acquire skills in the process of curriculum selection, to create the content (curriculum) of the subjects and to understand how teachers should proceed in their pedagogical activities.

## **1 Current trends in field didactics in technical subjects**

The developmental tendencies in field didactics, more particularly in teaching technical subjects, aim to strengthen the development of students' psychomotor skills. In fact, it is nothing new, but there is a problem in the background. Some aspects of contemporary life - e.g. consumer lifestyle, modern transportation, achievements of the information society, passive spending of leisure time, etc. - largely limit the spheres in which students can develop their motor skills. The motorics of the whole body develops in the process of handling objects, during game and physical work as such (Bajtoš, 2007). The whole above field should be perceived by the educational science from a new and thematic perspective as an important part of the concept of modern human culture trying to find a suitable aspect of transformation and educational content in schools. It is documented in a number of theoretical analyses and research in foreign pedagogical and didactic literature as a pedagogical-didactic issue, which helps students develop competences compatible with the requirements of the modern information society. Psychomotor skills can be developed by means of different forms of teaching - manual work, working with various materials, assembly and dismantling activities, designing, implementation of experimental activities, simulations, practical project work, various types of work activities at school and during practical training, performing social tasks, systematic work practice, etc. In the developed countries of Europe and the world, subjects focusing on the development of students' psychomotor skills have a firm place between

compulsory subjects. In the past, the main objectives of vocational subjects in vocational schools were to acquire a sum of knowledge and skills by the students. Vocational subjects differ from other subjects. One among their specific features is the focus of the teaching goals on the acquisition of the required motor skills. Vocational subjects belong to those subjects in which the cognitive processes have a distinct instrumental function, or possibly a procedural character. This means that knowledge is the basis for action, but it is not only about memorizing it but, above all, acquiring it and being able to apply it in practical activities (Švec, 2002).

Activities performed in vocational subjects, as well as the skills acquired by students, can have different character and focus. For example, in the lower grades of schools, practical activities prevail where the manual aspect of these activities is substantially represented. Practical activities in higher grades are rather characterized by intellectual activities (Kropáč, 2002).

The main function of vocational subjects is to teach students to perceive tasks and problems associated with the modern society, to establish their relationships to technology and the field of study as a part of vocational education. Alongside with the penetration of the world of technology, it is expected that young people get a basic overview of economic, ecological and ethical issues, too. The importance of creative work is also emphasized in vocational subjects as well as that of practical learning, which reinforces the individual experience of students. Psychomotor skills form an integral part of our lives; they can affect education, but have an impact on the development of students' personalities, too. The term psychomotor qualification refers to movement qualification associated with mental activity, which, in the context of educational practice, is associated with thinking and professional activity.

Acquisition of psychomotor skills is one of the priorities in teaching vocational subjects. For teachers of vocational subjects, it is not only important to know about the general requirements for theories of training, perceptual-motor learning theories, and theories of sensorimotor development in ontogenesis, but it is extremely important to be able to adjust these theories to a variety of learning conditions (Bajtoš, 2007). Theories of training are based on the assumption that the acquisition of psychomotor skills takes place in a dialectical combination of knowledge and practical activities and they intertwine, complement and enrich each other. The process of the development of psychomotor skills and habits undergoes, in principle, three stages in school conditions: the stage of theoretical knowledge of the activity (students acquire the necessary knowledge and visual knowledge of the activity but do not carry out the activity itself); the phase of the first experiments with the activity (it involves application of theoretical knowledge in practice and new temporal connections from the kinaesthetic analyser are established as a result of students' activity during the initial direct activity); and the training phase (i.e. a multiple, purposeful and planned repetition of the activity). Theories of perceptual-motor

learning are applied in the process of acquiring psychomotor elements, the formation of sensory perception, the formation of the ability to sensitively distinguish between the characteristics of objects and the relationships between them, the formation of temporal and spatial ideas. This type of learning and teaching forms the basis for sensorimotor development, for the development of motoric trainability and the realization of training (psychomotor). They rely on sensory perception, so, students' direct contact with the reality is preferred. In theories of perceptual-motor learning and teaching, the methods of practice and repetition are used. These learning theories are relatively neglected in schools, despite the advocated need to improve the movement culture of students. Perceptual-motor learning results in motor skills. An analysis of motor skills clearly suggests that not all motor manifestations can be referred to as motor skills. They are especially movement skills if their qualitative characteristics – the temporal-spatial structure of movement – as well as quantitative traits, and the basal performance reach the desired level.

The theory of sensorimotor development in ontogenesis deals with the field of action of the individual, in search of a connection with sensory perception and movement. First, the individual learns to perform basic movements, acquires communication and also a range of professional skills. The development of psychomotor skills is influenced by the available tools and aids as well. From the theories of sensorimotor development in ontogenesis, two periods are decisive (Čáp & Mareš, 2001):

- the period of puberty (in this period, there is physical disproportionality, which causes the clumsiness and inconsistency of movements) and
- the period of adolescence (characterized by balanced movement behaviour, good coordination of movements and excellent physical performance).

In the context of the pedagogical work of vocational subject teachers, we also consider Erikson's (1968) conception of the developmental stages of individuals. Erikson claims that people are exposed to a range of learning tasks in their evolution from childhood to an old age. Each task must be sufficiently mastered before an individual can successfully deal with the next one. This concept encompasses eight stages of development in which the individual goes through a crisis, understanding it as a turning point with markedly increasing vulnerability and potential. It is based on the assumption that individuals, at each stage of development, must resolve a certain psychosocial conflict. If they succeed, they can go on. At each stage, a new quality of personality develops, a struggle occurs in which the positive quality of the ego must outweigh in order to develop a new virtue. From the very beginning of an individual's life, it is determined what quality will develop at which stage because the whole development is subject to the principle of epigene (the theory of underestimation of the importance of inheritance in development), but at the same time, the development of the ego is determined by internal forces as well as by cultural

and social influences (Erikson, 1968). The importance of Erikson's theory lies in the fact that it has gone beyond the biological and maturation factors by emphasizing the social and cultural impact on the development throughout the entire life. A successful completion of each of these eight developmental stages also brings something that Erikson called "vital power" or an essential adaptive feature of the ego. Vocational school students are in the developmental stage of adolescence, in which individuals establish and build their identities.

## **2 Vocational subject teachers as a determining factor in the implementation of current trends in field didactics**

Concerning vocational education, currently, constant efforts are made to improve the quality of provided education and to modernize vocational schools. A modern vocational school should teach students to think critically, develop their problem-solving skills as well as entrepreneurial skills, and strengthen their links with professional practice. Some tools and approaches of the European Union - such as mobility support schemes for vocational training, building vocational school partnerships, etc. - aim to help modernize vocational schools. Modern vocational schools can be characterized as keeping up with technological development, which has an impact on cooperation between schools realized in electronic form (e-mail communication or other forms of on-line data transfer). It can be characterized as faster, more efficient, cost-saving, and popular among the current generation of students often referred to as the "net-generation".

Modern vocational schools are characterized by such features as openness and accessibility; flexibility; diversity; high quality; cooperation with public administration or the private sector; innovation; engagement and cooperation with local or regional communities; competitiveness; measurability; and presence - which means to be where the applicants, students, or graduates are - e.g. on Facebook, Twitter, etc. (Slavík, 2012; Duffy & Bruns, 2006).

Throughout the teaching process in vocational schools, more emphasis should be placed on developing students' critical and creative thinking, which is the basis for their ability to find their place in the labour market. In the current labour market, it is necessary to adapt to rapidly changing conditions of the economy and production, the ability of self-education throughout the productive age, as well as the ability of social interaction. The future graduates of vocational schools need to be prepared in such a way that they can solve various tasks, face the requirements of modern times, find original solutions, have a systemic approach and be able to cooperate in working teams.

If there is an insufficient space for and there is no emphasis on the development of reflection, critical thinking, and experiential learning during the preparation of future vocational subject teachers, changes in pedagogical approach under the influence of the school environment only rarely come. These teachers do not feel

like introducing innovations into their teaching practice, and thus, their views are resistant to any changes (Kubányiová, 2005). They remain traditional teachers who consider the blackboard and chalk their most important tools, they have a dominant position among their students and they only struggle with the overloaded curriculum every day. Teaching approaches that place students in the centre of the educational process are perceived by teachers as a general cliché, without any significant impact on the learning process. They do not realize that these approaches take into account the individual needs, interests, goals or diverse learning styles of learners and the fact that learners should be active partners in the schools' decision-making processes (Marks, 2014, p. 46). As a result, it can be presumed that the students can take over the responsibility for their education and they can influence the learning process. In the spirit of this philosophy, the goal of education is not only the cognitive, psychomotor but also the affective development of students, the promotion of their creative potentials, critical thinking, and social skills.

On one hand, it is a good signal that people lead discussion about the work of teachers, but, on the other hand, it is alarming that they speak about their insufficient qualifications, education based on encyclopaedic knowledge, their inability to develop their students' creativity or doing only what they have learned at school. Therefore, there is a need for a change in the current trends in school policy in Slovakia and it is necessary to focus both on increasing the quality of the preparation for the teaching profession and the quality of further training of teachers, as well as for creating a space for their systematic development. We believe that more attention needs to be paid to creating conditions for teachers to enable them to carry out the teaching process in the spirit of modern approaches in field didactics.

According to Turek (2004) and Bajtoš (2013), current approaches to the preparation of future vocational subject teachers following the newest trends in field didactics should ensure that future teachers develop the following competences and teaching abilities:

*The ability to plan and prepare teaching units (planning, organizational and managerial competences).* Vocational school teachers should be familiar with the conditions and processes within the school as a public institution, as well as the current school legislation and other standards and regulations related to the performance of the teaching profession and the profession they are preparing students for; and be able to apply this knowledge in their teaching work.

Teachers must be capable to carry out some basic administrative tasks connected with the registration of students and their educational results, as well as keeping their records and statements. They should manage their students' work and create conditions for effective cooperation in groups but also for institutional cooperation, including international projects. The achievement of this capability can be measured using the following indicators:

- Knowledge of students, their peculiarities, possibilities, and assumptions.
- Didactic transformation of scientific facts from the objective logic of the relevant science into the subjective logic of their acquisition by the student.
- Earmarking of the basic and expanded curriculum.
- Setting specific goals of the teaching process.
- Designing curriculum subjects.
- Planning individual teaching units - written lesson plans.
- Selection of appropriate teaching aids and didactic techniques, including multimedia.

*The ability to teach professional subjects (psycho-didactic competences).* Teachers should master a whole range of teaching and learning strategies on theoretical and practical levels in conjunction with the knowledge of psychological, sociological and causal aspects. Teacher trainees should develop a basic methodical repertoire for teaching a given subject and be able to adapt it to the individual needs of students.

Teachers must possess sufficient knowledge and have the abilities to create educational programs and courses, and use them in the process of lesson planning. They should apply information and communication technologies to promote students' learning. In the process of evaluation and assessment, they must be aware of the psychological aspects of various theories and apply appropriate tools respecting the individual peculiarities of students, as well as the requirements of a particular school. The achievement of this ability can be measured by the following indicators:

- Motivating students to learn.
- Didactic transformation of the teaching objectives into the students' language.
- Creating a favourable classroom climate.
- Permanent implementation of feedback.
- Selecting the optimal structure for each teaching unit.
- Activating all students in the classroom, application of a differentiated and individual approach to students.
- Using optimal teaching methods and organizational forms depending on the educational content, students' goals, abilities, and their learning styles.
- Using appropriate teaching aids and didactic techniques.
- Using information and communication technologies to promote students' learning.
- Assigning differentiated and appropriate homework for students.
- Using lesson time effectively.
- Flexibility - adjustment of the planned teaching activities to the current situation.



- Operative and effective solution of unpredicted problems occurring during the teaching unit (e.g. behavioural problems).

*The ability to objectively evaluate students' performance (diagnostic competences).* Teachers should be able to use the available means of pedagogical diagnostics based on the knowledge of students' predispositions, to diagnose social relationships in the classroom and reflect on the educational needs and interests of students.

Teachers must identify both students with special educational needs and gifted students, and adapt the selection of teaching methods to their needs and abilities. Moreover, they are in charge of solving behavioural issues, demanding pedagogical situations and problems. The achievement of this ability can be measured by the following indicators:

- Creating a favourable climate for testing the students.
- Regular monitoring of the students' learning progress.
- Selecting the optimal methods of testing and assessing students with adequate validity and reliability.
- Activating and involving all students in the assessment and evaluation processes.
- Taking appropriate measures to improve any unsatisfactory performance of students.
- Determining the students' attitudes towards the methods used in their examination and evaluation.
- Utilizing the results of the examination and screening of students with the aim to improve their teaching practices.

*The willingness to devote to their students also in non-teaching time (counselling and consultative competences).* Teachers of vocational subjects should possess sufficient organizational skills to assist students in their extracurricular activities as well. The achievement of this ability can be measured by the following indicators:

- Tutoring poorly performing students.
- Addressing extremely gifted students.
- Discussing school problems with students.
- Active participation in extracurricular student activities.

*The capability to communicate with students, their parents, colleagues, and school partners effectively (communication and social competences).* Teachers are responsible for creating a favourable socio-emotional classroom climate and for the promotion of professional socialization of students. For them, orientation in demanding social situations and mediating their solutions is important. Good teachers apply suitable means of pedagogical communication and effective communication strategies with their students and the school's social partners.

Communication and social competences can be perceived on four levels (Slavík, 2012):

Grammar competences - the knowledge of the language in which the teacher teaches correct pronunciation, knowledge of grammar rules and structures, language functions, vocabulary and the choice of appropriate language elements and styles.

Discourse competences - teachers must possess sufficient skills to combine words and their grammatical forms, to create oral and written texts suitable for various purposes (teaching texts, professional and popular articles, scientific texts, etc.). Rhetorical abilities (knowledge of the strategy of writing, ability to apply rhetorical figures, etc.) and knowledge of communication styles (private, artistic, administrative, journalistic, scientific, etc.) are also included.

Sociolinguistic competences - this is the extent to which teachers can create texts and understand them in various sociolinguistic situations (differences in communication between students, teachers, and scientists). This includes the ability to communicate in a variety of settings and situations (in and outside the school environment), the ability to communicate in different relationships (communication with students, co-workers, the public, media) and the ability to respond adequately across communication skills (speaking, listening, writing, reading).

Strategic competences - the ability to apply various communication techniques and their combinations in order to achieve the set educational goals. The achievement of this ability can be measured by the following indicators:

- Effective communication and establishing positive relationships with students, colleagues, students' parents, and other school partners.
- Providing true and tactful information to parents about the welfare and behaviour of their children.
- Creating harmonious relationships among the school staff, solving the occurring interpersonal problems and conflicts at the workplace non-violently.
- Effective collaboration with colleagues.

*The willingness to systematically reflect on their teaching work and participate in improving the quality of their school's work (self-reflective and assessment competences).* Teachers should engage in self-reflection based on self-evaluation and evaluation by others. They should also be capable of self-reflection based on qualified objective evaluation. Self-reflection can be characterized as the awareness of own (i.e. teaching) knowledge, experience, pedagogical experiences, and activities, especially from solving specific pedagogical situations. Self-reflection is a fundamental part of teacher training; it is one of the ways of developing the didactic thinking of teachers, which significantly affects the quality of their teaching activities. Self-reflection includes description

and analysis of the results of evaluation, organization and generalization of teachers' pedagogical experiences and knowledge.

Self-reflection allows teachers to anticipate certain challenging educational and learning situations, to find out about the efficiency of the applied procedures, to correct some forms and methods of work and leads to higher job satisfaction. Teachers most often engage in self-reflection when facing problem situations, evaluating the results of their activities over some time, trying new teaching methods, comparing their work with the work of their colleagues, or when encountering new knowledge in the field of educational science.

Self-reflection requires some maturity on the side of teachers, a sincere effort to perform well. Carrying out self-reflection is very important for teachers' professional development; therefore, it is necessary to recall its basic methods and techniques. These include self-reflecting questions, self-monitoring, audio and video records, observations, teachers' mutual observations, interviews with students, questionnaires for teacher evaluation by students, pedagogical diary, students' learning outcomes, etc. (Švec, 2002; Turek, 2008). The achievement of this ability can be measured by the following indicators:

- Systematic evaluation of one's own teaching experience.
- Monitoring and responding to changes, new requirements, and adapting to them.
- Active involvement in in-service teacher training.
- Improving one's own philosophy of education.
- Developing and implementing a plan for professional development.
- Enriching own knowledge by observing colleagues, attending various educational events, gathering feedback on their work from students, self-study, etc.
- Obtaining information from school partners regarding the level of their satisfaction.
- Active involvement in and support of joint projects aimed at improving the quality of education.
- Permanent improvement of the quality of own teaching activities by applying modern and effective means of teaching and conducting action research.
- Performing self-assessment regularly and improving teaching experience.

*The willingness to perceive and respond to the innovations in the field (subject-specific competences).* Teachers of vocational subjects should possess systematic knowledge and skills related to their specialization in the field in the extent and depth corresponding to the needs of the study program. They should be able to apply practical experiences from their fields in the teaching process, to transform the knowledge from relevant disciplines into the educational content, to integrate interdisciplinary knowledge and research results into school subjects, and to create cross-curricular links. Teachers should be able to search and process information, have user skills in the field of information and communication

technologies and be able to transform the methodology of knowledge from the field to the students' way of thinking. The achievement of this ability can be measured using the following indicators:

- Thorough mastery of one's own field of interest to the extent and depth appropriate to the needs of the curriculum in vocational schools.
- Orientation in related areas.
- Monitoring of material, technological and economic innovations in the given field.
- Applying practical experiences from a particular field in the teaching process.
- Transforming knowledge from relevant fields into the educational content.
- Integrating interdisciplinary knowledge and research results in the teaching process and establishing cross-curricular relationships.
- Providing ICT user skills.
- Integration of scientific methods into students' ways of thinking.

*Cultivated behaviour (competences cultivating teachers' personalities).* Teachers should have a general outlook (philosophy, culture, politics, legislation, economy, etc.) as they have an impact on the formation of their students' attitudes and value orientation. Teachers should act as representatives of a profession to prepare students by adopting the principles of professional ethics and patterns of professional behaviour. They can advocate certain didactic procedures and should cooperate with their colleagues. Teachers should be morally irreproachable and physically fit. The achievement of this ability can be measured by the following indicators:

- A general outlook in the fields of philosophy, culture, politics, legislation, and economy.
- Forming students' attitudes and value orientation.
- Being a representative of the profession for which the teacher prepares students.
- Respect for the principles of professional ethics and patterns of professional behaviour.
- Advocating selected didactic teaching methods.
- Moral integrity, physical fitness, and endurance.

### **3 Reflection on the current trends in the field of didactics in the study plan of the doctoral study program in the conditions of DTI University in Dubnica nad Váhom**

Study program Didactics of Technical Vocational Subjects in the field of study Field Didactics organically follows the master study program Teaching Technical Subjects. It contributes to the development of knowledge in field didactics and innovations in trade-technical specializations, as well as to improving the quality of the national school system and increasing its efficiency.

In this study program, an emphasis is placed on the acquisition of knowledge about the modern trends in field didactics and current trends in professional specialization, theory, and policy of vocational education, technology and humanization, educational psychology, and also the acquisition of knowledge and skills to implement valid and reliable pedagogical research. The qualitative requirements for successful completion of doctoral studies ensure that the students acquire knowledge about the latest trends of development in field didactics and also skills for a creative application of these trends both in the educational process and also in the field of scientific research.

After successful completion of the program, the graduates will be able to independently and competently teach technical vocational subjects and field didactics (i.e. to conduct an educational process through lectures, seminars, exercises, practices, pedagogical practice, and other educational activities). They will also become experts in field didactics, which can contribute to its development, and in scientific research in the field of teaching technical subjects for the second and third levels of higher education. Doctoral students learn about the standards, principles, and methods of scientific work in the field of pedagogical research and get an overview of the latest scientific knowledge in the above field of study in an international context. Graduates acquire skills in designing research projects and gain experiences in interdisciplinary cooperation on international level as well. Based on their research activities and findings, they will be able to design, verify and implement new educational procedures into teaching vocational subjects. The curriculum of Didactics of Technical Vocational Subjects, includes study courses, upon completion of which students in doctoral studies develop the teaching competences mentioned above - doctoral students develop their teaching competences in individual courses included in the study plan, but their improvement is not identical in each of the courses mentioned above and, therefore, we try to indicate the link between study courses and particular teaching competences in the text below:

- Planning, organizational and managerial competences are primarily covered by the study course "Current Issues of School Management". The main goal of the course is that after its successful completion, doctoral students can describe the essence and peculiarities of school management; characterize school management models; explain school management as a system; apply the legislative frameworks for school management; define levels of pedagogical management and the subjects of pedagogical management.
- Psycho-didactic competences are mainly developed in the course "Modern Trends in Didactics" and "Neurodidactic Aspects of Education". During these courses, students master new trends in general didactics; get to understand the current tendencies of education; become able to compare traditional and new ways of managing the teaching process; learn about the links between education and neuropedagogical and neurobiological aspects of teaching; become familiar with the principles of the evaluation of education

and apply it in connection with self-reflection in the context of their own educational activities; master current teaching concepts and present their contribution to the efficiency of education; learn to manage the educational process following the principles of neuroscience, which accentuate a strong involvement of brain in the processes of learning and cognition.

- Diagnostic competences are developed mainly in the courses "Methodology of Educational Research" and "Research in Field Didactics". The objectives of these courses are to develop students' ability to describe and characterize basic research methods and techniques in the area of streamlining the teaching process. After successful completion, doctoral students should be capable of carrying out student diagnostics and assess their students' performance; they should be ready to apply research methods and techniques in solving specific educational problems; plan, organize and evaluate research in didactics of technical vocational subjects; propose methodology of their own research projects, create own research tools, carry out quantitative pedagogical research, analyse and interpret obtained research results and propose recommendations for theory and practice.
- Counselling and consultative competences are in the centre of attention of the study course "Theory and Policy of Vocational Education" and "Vocational Education and the Labour Market". The main objectives of these subjects are: to describe the nature of school policy concerning vocational training; characterize the tasks, objectives, and problems of current vocational training in Slovakia and the EU; define the role of the state and school curricula in vocational training; analyse the basics of employment policy; know the principles of partnership and cooperation between employers and vocational education; to explain the role and importance of the National Qualifications Framework and the importance of certification in vocational training.
- Communication and social competences, as well as self-reflective and evaluative competences, are mainly covered by the courses "University Didactics" and "Educational Psychology". The main objectives of these courses are to critically assess and apply innovations from higher education didactics to the educational practice; identify, analyse and solve challenging field didactic problems of both empirical and conceptual nature; improve (modify) educational approaches in terms of teaching vocational subjects; master the theoretical concepts of educational psychology; understand the processes of education in emotional, motivational, communication, socializing, value, self-regulatory and creative areas. In practice, teachers should be able to implement and evaluate educational programs, including preventive programs, based on the gained theoretical knowledge.
- Vocational subject competences are developed in the courses "Innovations in Technical Specializations" and "ICT in Vocational Education". By a successful completion of these courses, students gain an overview of innovations in the areas of component base, modern materials, equipment,

technologies and their use concerning a specific teaching subject; improve their existing knowledge and skills in the use of ICT in vocational training; broaden their knowledge and skills in the fields of network applications and database usage; master the basics of efficient communication in Internet applications and e-learning environments; and improve their work with selected graphic CAD software.

- Personality competences are included in the courses “Developing Critical and Creative Thinking” and “Technology and Humanization”. Throughout these courses, doctoral students master the basics of critical and creative thinking; learn to analyse and subsequently identify identical and different factors of critical and creative thinking; to explain which strategies contribute to the development of critical and creative thinking in the conditions of the educational process; can apply creative and critical thinking development strategies in the teaching process; recognize the importance and the content of the most important human parameters for technical equipment as well as the aims and methods of their research and their usage in teaching technical subjects; they can theoretically and practically manage the ways of optimizing working systems - people versus technology.

The scientific part of the study program is based on the realization of pedagogical research on selected current scientific issues from the field of didactics. The obtained research results are presented at scientific conferences and are published in domestic and foreign scientific monographs, journals or books of conference proceedings. Doctoral students also actively participate in solving research projects as research team members. The requirement for fulfilling the study program in science can be divided into two parts: the scientific part of the study program (in the study course Dissertation Project) and creative activities in the field of science (in this case the system of allocation of credits for individual subjects of research work in the doctoral study is followed).

DTI University in Dubnica nad Váhom permanently supports and conducts research activities focusing on the current issues of international importance, participates in research projects and achieves high-quality results accepted in the professional community. DTI University has also been awarded grants for research and for presentation of the results of research activities. Based on the above, in the current academic year, DTI University has been granted the right to conduct habilitation and inauguration procedures in the field of study Didactics.

## **Conclusion**

Recently, an increasing interest in studying field didactics can be observed. This is because it is closely linked to vocational training significantly supported by the state education policy, which is reflected in the strong emphasis placed on practical training activities in vocational education. Another important factor is

that currently, the role of lifelong learning in the context of vocational training is accentuated, which contributes to an increase in the graduates' adaptability to the requirements of the labour market. Knowledge of the above facts necessarily leads to the need for innovation of teacher training, which we are trying to satisfy by our educational and research activities at DTI University in Dubnica nad Váhom, Slovakia, especially by implementing the latest knowledge from field didactics in the creation of relevant new teacher training programs. Only high-quality teacher training, development of individual teaching competences, and their application in everyday educational practice can provide the basis for a change in the quality of teaching at our schools (Bajtoš & Orosová 2011; Petty, 2013).

In the pedagogical-didactic preparation of teachers of vocational subjects, it is necessary to use teaching approaches which can improve the acquired teaching competences of future teachers and to follow the current trends in field didactics. We believe that it is the highest time to focus our attention more vigorously on the development of the personality of vocational subject teachers based on the teacher education reform.

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