Professional Competences of Technology Novice Teachers in Slovakia: Case Study

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Abstract

The paper deals with the issue of professional competences of *Technology* subject teachers. In Slovakia the subject is taught at lower secondary schools. In the first part of the paper the specifics of the professional competences of the teachers teaching this subject are discussed. In the second part of the paper the selected results based on the collected data from a case study survey are presented. The main objective of the case study was to assess the readiness (strengths and weaknesses) of the novice teachers of *Technology* subject after their start of teaching career at school. The presented data show that *Technology* novice teachers struggle not only with different specific competences for teaching the subject but also some of their general competences require improvement.

Keywords:	Schlüsselwörter:
Lower secondary education (ISCED 2)	die Grundschule
School subject Technology	das Unterrichtsfach Technik
Technology teachers	der Techniklehrer
Novice teachers	der angehende Lehrer
Teacher's professional competences	profesionelle Lehrerkompetenzen

1   Introduction

The time in which we live and work is demanding for employment. This factor also influences the current education policy that is geared towards ensuring the quality of education. As to teacher training, we can specify two sides of one coin here. On the one hand, novice teachers must demonstrate sufficient acquisition of knowledge, abilities and skills required to pursue their profession, on the basis of which their designation may be "good teacher". On the other hand, there is a question of assessing the level of competence of teachers, or the question of assessing the development of teachers' competences within their professional profile. In addition, with regard to the teachers of variety of major subjects, the specifics of the taught subject, which are based on the application of different specific competences in teaching the subject, must be taken into account. For *Technology* Teachers, the questions to be answered are the following ones: What are the specifics of *Technology* teacher professional profile and what is the quality of graduates in study program teaching *Technology*, i.e. how they are prepared and educated for the practical execution of their profession.

2   Specifics of the subject *Technology* and its qualified teaching

2.1   Implementation of technical education at lower secondary schools

Technical education at lower secondary schools in Slovakia is currently being implemented through the school subject *Technology*. The subject *Technology* is taught to students at the age 10-15, who are in grades 5-9 of compulsory schooling, in a time allocation of 1 lesson per week. According to the State Educational Program (ŠPÚ, 2015), the purpose of this subject is to guide students to acquisition of basic skills and competences in

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different work areas of human activity, to contribute to students' deeper understanding of the various jobs and professions connected with the subject of *Technology*, to their familiarization with the labour market and ultimately to the development of the students' life and professional orientation.

The content of the subject is based on specific life situations in which man comes into direct contact with human activity and technology in its diverse forms and wider contexts and, through technical achievements, protects the world and cultural heritage. The concept of the subject is based on the practical activities of students. The subject is focused on skills and habits useful for students' future life in society, using creative thinking and co-operation among students.

The content of the subject matter is intended for all students regardless of gender. Students learn to work with different materials and devices, acquire basic working skills and habits, and develop their creative technical thinking. When developing design and working practices of products, they combine practical skills with creative thinking. The subject enriches the basic education of students with an important component laying the foundations in the field of technology that are indispensable for further study and functioning of man in real life. Students learn to plan, organize and evaluate their work independently and also in a group. They are guided how to adhere to the principles of safety and hygiene at work. Depending on the age of the students, a system is being developed that provides students with important information from the world of work and helps them to make responsible decisions about their future professional orientation and decision-making in life.

The basic tasks of the subject *Technology* (ŠPÚ, 2015) include:

- teach students to distinguish and safely use natural and technical materials, tools, and equipment;
- teach students to adhere to established rules and to adapt to changed or new tasks and working conditions;
- teach students to experiment with ideas, materials, technologies and techniques;
- form suitable and appropriate habits of students for family life;
- develop students' sense of responsibility for their health, interpersonal relations and finances as well as for the convenience and security of their immediate surroundings and environment;
- develop students' sense of responsibility for the quality of their own and their common work results;
- develop students' basic working skills and habits from different work areas;
- teach students how to plan and organize their work and use appropriate tools, instruments and aids at work, and in everyday life;
- lead students to perform their basic tasks persistently and consistently, apply creativity and their own ideas in their work and efforts to achieve quality results;
- form students' basic attitudes and values in relation to human work and the environment;
- develop students' perception of work and work activities as opportunities for self-realization, self-actualization and the development of entrepreneurial thinking;
- teach students to orient themselves in different fields of human activity, forms of physical and mental work;
- develop students' knowledge and skills necessary for their employment, choice of their professional career and further professional and life orientation.

2.2 *Technology* teacher competency profile

The above-mentioned tasks clearly point to the fact that the subject *Technology* is characterized by significant specificities compared to other general subjects taught at lower secondary school. The specifics of the subject of *Technology* relate mainly to its focus on the practical activities of students and the development of their manual skills. In order for the subject *Technology* to fulfill its mission, it is necessary for schools to have specially equipped classrooms - school workrooms designed for practicing the practical teaching of *Technology*. The essence of the work in school workrooms is to teach students how to handle and work with different tools, devices and various types of materials, develop their skills in this direction, teach them to adhere to work habits and work safety and lead them to create and make their own products, both on their own and in group work (Serafín et al., 2016; Valentová – Brečka, 2017).

The specifics of the subject *Technology* should also be reflected in the competency profile of the *Technology* teacher. This means that the *Technology* teacher, in addition to the "core" competences necessary for the successful performance of the teacher's educational activities (i.e. competences that are common for the successful performance of the teaching profession independently of the subject being taught, such as, for

example, the competence to identify the student's developmental and individual characteristics, the competence to identify the psychological and social factors of student learning) should also have other, specific competences related to the knowledge of the content and the didactics of the subject (i.e. the knowledge of the subject matter of the *Technology* and the knowledge of the didactics of *Technology*). This is the matter of the teacher's ability to successfully implement educational activities in the school's workroom environment (a special classroom equipped with special tools and instruments needed to make and produce simple products from different types of materials).

Experts in the field of education pay close attention to problems of evaluating teacher competences (Vítečková, 2014). Within the European Community the assessment of teachers' competences has long been one of the priorities of the EU's education policy (EC, 2002, 2007, 2011, 2012; EURIDICE, 2003a, 2003b; Hargraeves, 2002; Magová et al., 2016). In Slovakia the issue has been incorporated into legislative documents (Law 317/2009; Law 568/2009; Kasáčová, 2006; Kasáčová et al., 2006), and various projects and researches (Babiaková, 2008; Hockicková – Žilová, 2015; Horváthová, 2011; Jonášková et al., 2016; Kajanová, 2013; Kosová, 2006; Müglová – Malá, 2017; Pisoňová, 2010; Trojanová, 2014) deal with it. However, in most cases this issue is solved on a general level, without focusing on the particular subject teacher profile (it cannot be generalized, see e.g. Jakubovská et al., 2016; Jonášková, 2015; Kramáreková et al., 2016; Stranovská – Chválová, 2016). In our case, we have focused on competency profile of *Technology* teacher.

3 Methodology of the case study

The purpose of the case study was to assess the strengths and weaknesses of the specific competences of *Technology* teachers, and these strengths and weaknesses were monitored within the category of novice teachers. The competences of *Technology* teachers were tracked in two planes - the first one was teaching the subject in standard classroom, and the second one was teaching the subject in school workroom (specially equipped classroom).

Respondents of the case study were novice teachers of the subject *Technology*, i.e. teachers whose length of school work did not exceed 5 years (Tarčáková, 2017). Based on availability, a sample of 19 teachers from 18 lower secondary schools was created. At this point, an objection to the size of the research sample could be raised. However, it is necessary to draw attention to the constantly decreasing interest of prospective students in study program teaching of *Technology* subject and, on the other hand, to the tendency of school managers to provide teaching *Technology*, due to the low number of lessons allocated to teaching of this subject, by unqualified teachers (which results in high percentage of unqualified teaching of the subject at schools: Hašková - Bánesz, 2015; Dostál et al., 2017; Bánesz, 2013) and the related problem of the low number of adequate potential respondents in schools.

To characterize the research sample (as well as due to the qualitative analysis of the results), three segmentation data were used, namely sex, major subjects, length of school teaching.

In terms of segmentation data, the research sample consisted of 13 females (68 %) and 6 males (32 %); 11 graduates of the single major teaching study programs in teaching the subject *Technology* (58 %) and 8 graduates of the double major teaching study programs in teaching the subject *Technology* in combination with another subject (42 %); 4 respondents' school teaching was more than 3 years (but not more than 5 years), 2 respondents taught at school more than 2 but less than 3 years, 3 respondents taught the second year at school, and 10 novice teachers just started their first year at school.

All respondents were contacted and addressed via e-mail. They were asked to cooperate by filling in a self-assessment online questionnaire. In the questionnaire the respondents evaluated their competency through focusing on 21 abilities related to the implementation of Technology teaching, both in standard and specialized classroom (school workroom). Self-evaluation was done using the 5-point Likert scale, where the competency was assessed as follows:

     1 - *very good level*;
     2 - *good level*;
     3 - *sufficient level*;
     4 - *low level*;
     5 - *insufficient level*.

Below we only present the results related to the specific competences of *Technology* teachers.

4   Results and their discussion

Results of the respondents` self-assessment of their competences, the specific ones for the *Technology* teachers are presented in Figures 1 – 8. In each figure can be seen both, absolute and relative frequency of the different assessments of the competence for which the results are presented in the figure.

One of the questionnaire items was devoted to finding data about *Technology* novice teachers' ability to use specific teaching aids in teaching the subject (Fig. 2). Specific teaching aids, as equipment in special school classrooms or workrooms, can include devices and tools for the production of products. Teachers must possess the ability to manipulate and use the instruments and tools in the school workroom in order to teach students how to use these devices in practice. The results show somewhat weaker readiness of *Technology* novice teachers to use specific tools compared to their readiness to use common teaching aids in teaching process (the ability to use common learning aids was evaluated by 42 % of respondents at the *very good* and *good level* and 16 % of respondents at the *sufficient level*).
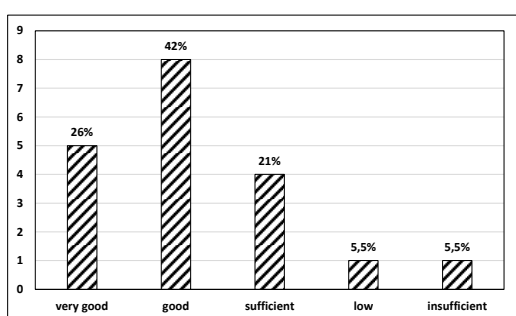

Fig. 1: Results of the assessment of novice teachers' knowledge regarding the content of the subject *Technology*.
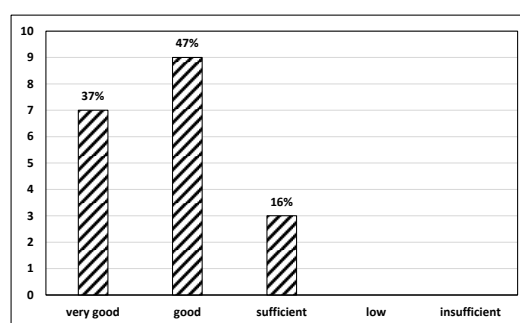

Fig. 2: Results of the assessment of novice teachers' skill to use teaching aids specific for the subject *Technology.*
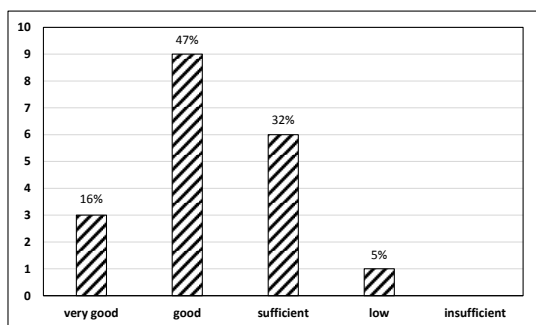

Fig. 3: Results of the assessment of novice teachers' skill to use cross-subject relations in *Technology* teaching
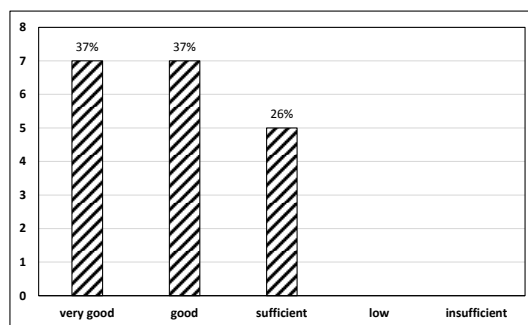

Fig. 4: Results of the assessment of novice teachers' skill to manage and control the work of students in workrooms.
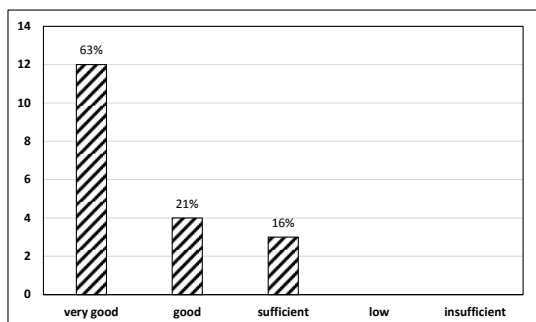

Fig. 5: Results of the assessment of novice teachers' skill to use work tools and instruments in the workroom.
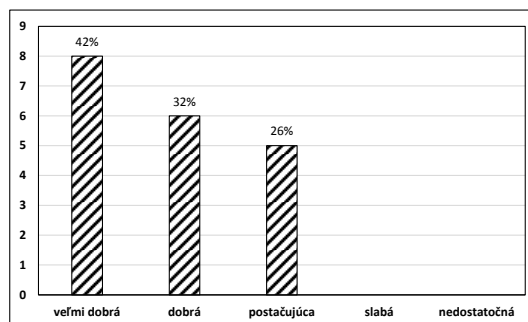

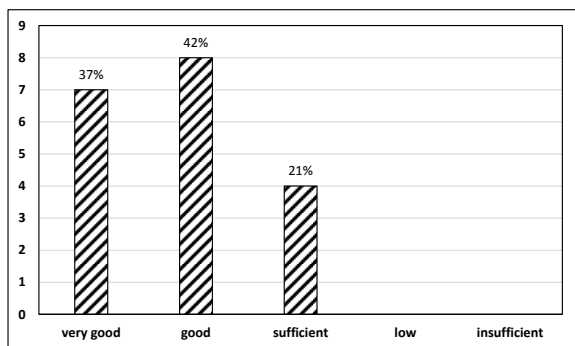**Fig. 6:** Results of the assessment of novice teachers' skill to produce objects.

Fig. 7: Results of the assessment of novice teachers' skill to create learning activities for students work in a workroom.
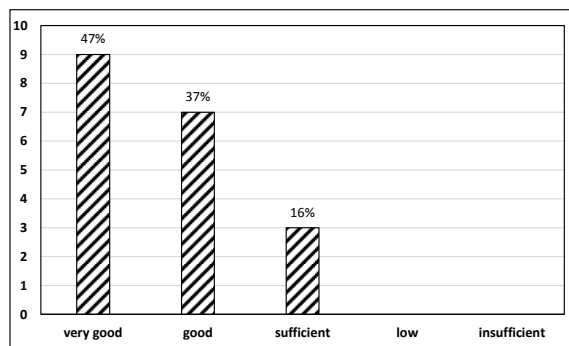

Fig. 8: Results of the assessment of novice teachers' skill to solve the problems that arise when working in a workroom.

The school subject *Technology* is closely related to the subjects of mathematics, chemistry, and physics. Knowledge in these subjects is inevitable for being successful in learning the subject of *Technology*. As can be seen in Fig. 3, novice teachers evaluate their competence in this area quite positively: 16 % of novice teachers claimed that they were well aware (*very good level*) about the cross-subject relations. Up to 47 % of the respondents tagged on the scale *good level* of their awareness and 32 % of the respondents tagged *sufficient level*.

Teaching in a school workroom requires more teachers' attention, constant warning of students to adhere to specified rules of behaviour in the workroom and also to look after their safety. Practical training in a school workroom is based on product manufacturing, handling and manipulating instruments and tools. In lower grades some activities, such as drilling and sawing, can be performed by the teacher in order to ensure safety. In higher grades (7 - 9) these activities can be performed by students, but under the strict supervision of a teacher. The ability to organize and manage students work is closely related to teacher's ability to evaluate students' knowledge and skills. The teacher must be well aware how to assess these skills and abilities of students as well as their theoretical knowledge to be able to organize and manage the work of students in school workroom. As can be seen in Fig. 4, the ability to organize and control the work of students in the workroom can be considered as strength in *Technology* novice teachers' competence profile.

Teachers who teach the subject *Technology* must have the acquired skills and abilities to use various working tools and devices that belong to the equipment of school's workroom to teach the students how to use the tool or device appropriately and how to handle them. The result of approximately 70 % of the respondents who declared *good* and *very good* level of their competence to organize and control the work of students in the workroom (Fig. 4) corresponds with the results of more than 63 % of the respondents who assessed their competence to use the work tools and instruments in the workroom on the level *very good* (Fig. 5).

Results of the data collected from the *Technology* novice teachers' self-assessments of such competences as:

- to produce new samples of products (examples of products to be demonstrated to students, Fig. 6),
- to create learning activities for students work in the workroom (Fig. 7), and
- to solve problems arising during the work in a workroom (Fig.8),

are very similar and can be perceived as quite satisfactory. However, we can see that though the respondents do not have quite serious problems to solve the difficulties arising during the work in a workroom, in some cases they can feel uncertain and embarrassed when designing and developing learning activities to be carried out in the workroom; the highest level of uncertainty was identified in relation to teacher`s own skills to produce new objects in the workroom.

5   Conclusion

The survey carried out with *Technology* novice teachers showed, except of data presented in the text above, that novice teachers struggle not only with their specific competences for teaching the subject *Technology*, but as their weaker competences were identified also the following ones:

- competence to communicate with students,
- competence to create a positive class climate,
- competence to build on cross-subject relations,
- competence to assess the strengths and weaknesses of the teaching situations to be managed by the teachers,
- competence related to teachers´ creativity (skill to create).

Although these skills appeared to be less developed with novice teachers of *Technology*, the level of their "insufficiency" does not represent any more serious drawback for the educational process.

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