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Pedagogical Diplomacy

Diese Sonderausgabe erscheint unter der Ägide von Roman Hrmo und Lucia Kristofiaková. Ziel ist der Austausch über relevante Trends, Forschungsergebnisse und praktische Erfahrungen in der Ingenieurpädagogik.

10. Jg. (2023), Sonderausgabe 1

Ingenieurpädagogik

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Editorial

DOI: https://doi.org/10.53349/resource.2023.is1.a1205

The focus of this special issue "Pedagogical Diplomacy" is published under the auspices of Roman Hrmo and Lucia Krištofiaková, both affiliated to DTI University, former Dubnica Institute of Technology in Dubnica nad Váhom. This special issue of R&E-SOURCE aims to share relevant trends, research results and practical experiences in engineering pedagogy.

In order for teachers to effectively fulfil their tasks (education, training and personality development of learners), they require a deep understanding of their subject, good pedagogical training and a high level of general knowledge. In this field, the activity and importance of the "Internationale Gesellschaft für Ingenieurpädagogik" (short: IGIP) occupies an irreplaceable position.

IGIP was founded in 1972 at the University of Klagenfurt by Professor Adolf Melezinek. Establishing engineering pedagogy represented a step forward at that time, because never before had engineering and pedagogy been linked on a scientific level. Already in the 1970s, European integration and standardised profiles for educators were considered the most important factors for education, training and learning. Engineering pedagogy is a scientific cross-discipline that transfers the knowledge of pedagogy and psychology into the field of technical sciences in order to increase the didactic effectiveness of education.

The subject of engineering pedagogy is the knowledge required to prepare teachers for the education of future engineers in technical subjects. IGIP promotes scientific research, coordinates and supports international efforts and activities in the field of engineering education.

The main topics covered in this volume are teacher education, engineering education, new trends in industry didactics, accreditation, curriculum development, quality in education, technical teacher education, key competencies, networks of social sciences in engineering education, information and communication technologies in education, talent development, lifelong learning.

Roman Hrmo und Lucia Krištofiaková

Attitudes of Secondary School Teachers Towards Professional Development and Innovation

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DOI: https://doi.org/10.53349/resource.2023.is1.a1186

Abstract

Being a teacher in vocational education is a challenging profession. The demands on teachers' personal and professional qualities are increasing. Maintaining constant positive motivation to work and further professional development is not easy. In secondary vocational schools in the Czech Republic, teachers of practical teaching and theoretical vocational subjects often work side by side. This paper aims to report the results of a survey conducted at a secondary vocational school focused on gastronomic technology that focused on teachers' attitudes to professional development, preferences in further education and attitudes to innovation. The survey was completed through a questionnaire in the spring of 2022, and 117 teachers responded. This paper will present the results of the survey aimed explicitly at comparing the attitudes and opinions of above defined two different groups of teachers, as well as comparing the results according to professional-demographic characteristics.

Keywords: Professional development, Further education, Secondary school teachers, Vocational education

1 Background

The desired values of the future are more than others creativity and initiative, professionalism, with personal responsibility. Such a change in education can only be implemented with teachers' active participation and involvement. The teaching profession is now becoming far more demanding and complex than it was before. The demands on teachers' personal and professional qualities are increasing, as are their duties and responsibilities. Quite frequently,

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it is possible to encounter teachers who are no longer motivated to work and remain in education for the sake of existential reasons (cf. Lazarová, 2011). At the same time, we can read in the professional literature that the older the teachers are, the richer their professional experience is. Compared to young, less experienced teachers, they can better cope with complex situations of school life (Průcha, 2009). The quality of teachers is generally "considered to be a decisive factor that has a significant impact on the quality of school education" (Spilková, 2010, p. 21). The personality of a teacher consists of a complex of knowledge and pedagogical skills, personal qualities, and behavioural patterns. A quality teacher possesses professional and pedagogical competencies to perform their profession, acquired by studying a specific field in secondary or higher education and subsequently by further education and professional development.

The so-called Education Act defines secondary education in the Czech Republic by Act No. 561/2004 Sb. on preschool, primary, secondary, higher vocational and other education. This Act also prescribes how a teacher can obtain a professional qualification. The Education Act clearly defines the objectives and organisational form of secondary education. Secondary education is divided into theoretical and practical teaching and education outside the classroom. Practical teaching is divided into vocational training, apprenticeship and professional or artistic practice and sports training, according to the sub-disciplines of education. During the period of practical training, the regulations of the Labour Code, which stipulate working hours, occupational safety and health, the care of the employees and working conditions for women and adolescents, and other regulations on occupational safety and health, apply to pupils (Czech Republic, 2004). The competent teaching staff is responsible for compliance with these guidelines and the entire course of practical training. During practical training, pupils perform some work activities that are derived from the content of the training. In the case of some productive work, pupils may be financially rewarded for it.

There are different types of teachers in secondary education. The teaching profession is one of the regulated professions. The conditions for its performance, including requirements for professional qualifications, education, or experience, are defined in the Czech Republic by Act No. 563/2004 Sb., on Pedagogical Staff. In particular, Section 9 regulates the conditions for obtaining the qualification of a secondary school teacher (Czech Republic, 2004). In general, secondary schools are most often staffed by teachers of general education subjects, vocational subjects, practical teaching, and vocational training. Their structure can be seen in the table below.

	Converted hours					
	men		women		Total	
Teachers of general education subjects	7155.5	31.8%	15329.1	68.2%	22484.6	58.8%
Teachers of vocational subjects	4151.3	44.3%	5216.3	55.7%	9367.6	24.5%

Teachers of practical teaching and vocational training	3893.4	60.7%	2517.8	39.3%	6411.3	16.8%
Total	15200.2	39.7%	23063.2	60.3%	38263.5	100.0%

Table 1: Converted number of secondary school teachers in the 2018/2019 school year by gender and their average age

In principle, readiness and willingness for lifelong learning are a prerequisite for the teaching profession. Lucas (2007, p. 365) states that, in general, teachers' professional development can be interpreted “as their changes over time” – change in knowledge, change in attitudes, change in teaching practice, etc. Adamec (2019, p. 166) agrees with this; he perceives professional development as “a process of permanent coping with changes in the profession which includes all dimensions of teachers' personal development and competencies “. In doing so, the professional development of teaching staff should be the development of existing competencies and the acquisition of new ones to enhance the education of the students entrusted to them.

2 Motivation for Work and Further Education

The individuality of each of us is linked to specific relationships, and changes in these relationships are also the result of changes in behaviour and motivation. Some form of motivation is hidden behind every human activity. According to Egger (2005, p. 4), motivation is “a useful long-term management tool in understanding and assisting individuals in different job roles to bring out the best in themselves”. Thus, motivating staff means understanding the factors that lead to their motivation and those that hinder it. Motivated employees are more willing to take on tasks, are more diligent, make fewer mistakes, achieve better results, and cause fewer problems and conflicts.

Thus, motivation to learn is also determined by a combination of internal and external factors that either feed or hinder it. While intrinsic motivation stems directly from the person and thus demonstrates that the activity is pleasurable and brings them pleasure and satisfaction, extrinsic motivation results from external pressure. Adult individuals often enter education for both of these reasons, where employer´s pressure may be supported by a desire to learn something new (Rabušicová, Rabušic & Šeďová, 2008, pp. 97-98). This is the ideal state when both motivational factors operate simultaneously. Intrinsic motivation results from the needs and interests of the person. Its goal is self-satisfaction, which tends to be a powerful motivator. If there is a match between the personal needs of the staff and the goals of the organisation for which they work, long-term motivation is created. Therefore, the organisation should be concerned with what fulfils the employees and their aspirations. Typical intrinsic motivation stimuli concerning the job are recognition, performance, visible results, autonomy, responsibility, new skills, broadening skills, deepening qualifications, social

relevance, etc. Typical extrinsic motivational stimuli are a reward, punishment, salary amount, working conditions, privileges, benefits or sanctions, status and title, security, etc. Material motivation includes all financial rewards. They are also the most interesting to employees and are the source of the strongest motivation. However, they provide only a short-term motivational effect. Intangible motivation is represented by forms of rewards which, although they cannot be touched, develop knowledge, expertise and experience, thereby increasing the attractiveness of the job. Motivation can also be divided into positive motivation and negative motivation. If we reward the desired behaviour, we are talking positive one. Negative motivation is when we punish undesirable behaviour – it is meant to prevent mistakes from happening again.

In the context of adult education, the level of motivation is often adequate for educational achievement. According to the findings of Rabušic, Rabušic and Šeďová (2008, p. 109), motivation in adult education shows significant differences between the formal and informal sectors. While work motivation is paramount for interest in formal education, informal education is often stimulated by non-work reasons. It is noteworthy, however, that for individuals with different levels of educational attainment, different effects of work motivation emerge. Thus, the findings show that the higher the education, the higher the share of non-work motivation, i. e. more educated individuals more often perceive further education as "a tool for increasing their human capital, but also as a means of self-cultivation and personal development" (Rabušic et al., 2008, p. 109). Law and Glover (1996 in Vránová 2013, p. 21) concluded in their research that the primary source of motivation for male teachers is the amount of pay and the possibility of career growth. Female teachers consider job satisfaction, good working conditions and interpersonal relationships more critical than whether their workload is compatible with family life. The ability to target specific factors in the choice of incentives is now in the hands of the school principals. It is thus up to them to match the needs of their staff with the needs of the school.

In that context, there is also an ongoing discussion about the demotivators in school. These are counterproductive practices that occur in the school daily and are mainly: politicking; unproductive meetings; hypocrisy on the part of management; concealment, withholding of information; low quality of work of staff and management, its male qualification; constant, ineffective, hasty changes. Handy (1990 in Světlík, 2006, p. 245) defines five essential prerequisites for the motivation of teaching staff: rational-economic; social; self-actualisation; complex; psychological. We all have different needs, interests, abilities, temperament, aptitudes, etc. These personal characteristics are tied to certain relationships, and because of their changes, there are changes in everyone's behaviour and motivation (Světlík, 2009 in Vránová, 2013, p. 21).

A necessary condition for ensuring the quality of the work of a particular school is undoubtedly the teaching staff cooperating with their colleagues through the school's plan for their pedagogical development. The development of pedagogical skills is conditioned primarily by the motivation of individual teachers. However, there are several differences "how much time, energy and effort they are willing to devote to reflecting on, evaluating and

improving their pedagogical skills" (Kyriacou, 1996, pp. 28-29). This fact can be seen as an obstacle when the teacher has already acquired sufficient pedagogical skills to perform good teaching. This is mainly because teaching often becomes routine for them from now on.

3 Teachers' Professional Development and Further Education

The term professional development has many interpretations and connotations. It is associated with professional growth, further education, lifelong learning, etc. According to Kohnová (2012, p. 21), teachers' professional development consists of three essential components: institutional continuing education; self-development; knowledge, experience and skills acquired through professional practice as a teacher. Adamec (2019, p. 166) agrees when arguing that professional development is usually divided "into professional improvement through teaching practice, self-study, and further education". The broad definition of the term allows for a variety of perspectives and "encompasses various forms of education and professional training for persons (youth and adults) who have already undergone some level of formal schooling" (Průcha et al., 2013, p. 43). Teachers "should be the first ones for whom the most optimal conditions should be created and for whom lifelong learning should become a necessity, a matter of course and a need". Krojzlová (2007, p. 130). Thus, there is no doubt that teachers' continuing professional education, as well as their personal development, is an ever-present need, essential for the quality of education and upbringing. For Lazarova and Prokopova (2004, p. 261), further education is essential for continuing teacher professional development. It is linked to "the teacher's professional career but also the school's development, school policy and social development in general". The professional development of teachers in the Czech Republic is based on the applicable legislation, according to which teachers, including school principals, are obliged to undertake further education during their teaching practice and thus continuously renew, maintain and supplement their qualifications. To this end, the law grants them a leave of absence for self-study of 12 working days per school year.

Further education is one of the main forms of professional development in the Czech Republic. This is generally defined as "the provision of organised programmes designed to support in-service teachers as one of several possible systematic steps that support teacher development" (Glatthorn & Fox, 1995 in Lazarová & Prokopová, 2004, p. 263). In the Czech Republic, in-service teacher education is a part of lifelong learning and the centre of teachers' professional development. This means that a teacher has both the right and the obligation to participate. This systematic and coordinated process builds on undergraduate education and accompanies the teaching staff throughout their professional career. It provides two core functions – standardisation and development. By fulfilling these functions, it ensures that the quality and level of the existing education system are maintained while supporting its

development and innovation (Toužilová, 2016, n. p.). Furthermore, only accredited educational institutions can educate teaching staff through accredited educational programmes. The Ministry of Education, Youth and Sports of the Czech Republic is currently responsible for granting accreditation. The following legislative norms regulate the issue of qualification requirements for the teaching profession in the Czech Republic and the methods of further education of teaching staff:

- Act No. 561/2004 Sb., on pre-school, primary, secondary, higher vocational and other education (i.e., the Education Act);
- Act No. 563/2004 Sb., on pedagogical staff and on amendments to certain acts;
- Decree No. 317/2005 Sb., on further education of pedagogical staff, accreditation commission and career system of pedagogical staff.

Decree No. 317/2005 Sb., on further education of pedagogical staff, defines, among other things, the possible forms of further education, which are mainly: study to meet qualification requirements, study to meet other qualification requirements and study to deepen professional qualifications (Czech Republic, 2005). The scope of further education activities can range from four hours to several semesters. There is a variety of forms of further education that can be organised both in and out of the school environment. The most common include courses, workshops, seminars, training, school exchanges, action research, project work, supervision, peer tutorials, discussion groups, studying texts and other documents from the Internet, discussion forums and e-learning, international visits, etc. There is no doubt that contextual or personal factors influence the teachers' choice of particular types of in-service training. Contextual factors include, but are not limited to, the culture, climate and objectives of the school; the voluntariness or obligation to participate; the organisation of the learning event; the formality of the learning event; the atmosphere of the learning event; the format and accessibility; and the financial possibilities. Personal factors include character traits, values, attitudes, expectations, needs and interests, previous experience, teacher age, career stage, education and approbation, psychological and health condition, family situation, workload, etc. (Lazarová & Prokopová, 2004, p. 264).

4 The Role of Innovation and Change in the Life of a Teacher

Research shows that teachers are “aware of the importance of education for the quality of their teaching work”, just as they are “aware of the importance of education for enhancing the prestige of their profession” (Havlik, 1999, p. 150). As in other professions, however, there are those among teachers who persistently resist such changes in their profession. Lazarová (2005, p. 102) describes a kind of defiance or resistance to change and professional development when she refers to “resistance to change”. The source of resistance maybe not

only their comfort, reluctance, or maladjustment, which are often the first things that come to mind, but also previously negative experiences, current personal problems, stress, frustration, burnout syndrome, little or no stimulation and support from superiors, or deficiencies in planning and implementing change. Thus, it may not always be the case that the teacher is a bad teacher, and with the proper guidance, it is possible to reverse this situation. At the same time, the resistance to change can highlight persistent problems that hinder the school's development and innovation. Kyriacou (1996, pp. 28-29) cites a change in their established approach to pedagogical skills that the new ways would require of them as one of the primary reasons that lead teachers to adopt a negative attitude towards particular innovations in educational projects and activities.

The teaching profession is threatened by occupational stress. Teachers face high demands related to conceptual changes in education, administrative burdens, the need to address pupils' educational problems and demand cooperation with their legal representatives. Teachers often act as counsellors and psychologists who are constantly available to their pupils. The need for continuous self-education to keep up with rapid developments, especially modern technology, brings additional value to the teaching profession and reduces mental resilience. These problems can lead to a drop-out of the teaching career, not infrequently by novice teachers. We must not forget the so-called institutional causes of workplace stress. Calabrese (1987 in Aišmanová & Novotná, 2009, p. 136) divided the most common stressors of the teaching profession into three areas – school administration, school organisation, and the classroom. Unfortunately, “many teachers are distrustful of change and are not easy to be convinced of the need to change education in light of a changing society” (Starý, Dvořák & Greger, 2012, p. 17). It is clear that “a teacher change, as a necessary consequence of effective professional development, is complex, difficult to predict, and dependent on prior experience (life and professional history), willingness, ability, social conditions, and institutional support” (Day, 1999 in Lucas, 2007, p. 366). Regardless of the impetus from which it stems, resistance is a natural human response to change. It is a psychological phenomenon that is desirable to understand and to influence positively. “It hinders the achievement of goals, disrupts plans and impedes development” (ibid.) (Lazarová, 2005, p. 103).

There are also cases where school management or teachers themselves encourage resistant behaviour. Supovitz and Zeif (2000 in Lazarová, 2005, p. 105) further investigated this phenomenon. They found that length of experience or age had a negligible effect on teachers' reluctance to participate in school innovations and summarised barriers to teachers' professional development into four groups: structural barriers (time and financial availability, time for work and family), content barriers (teachers' interests, matching teachers’, and school needs); school barriers (school culture); and departmental barriers (school policy and its needs). Richardson (1997 in Lazarová, 2005, p. 107) provides specific explanations and divides the causes of resistance into just three levels. The first level represents resistance to change or a simple misunderstanding of the m second level (probably the most common); it is no longer resistance to change but its effect on people, who often feel threatened, suspicious, and unconsciously resist change. They fear that they are not counted on; will lose

respect, status, power, or control; and that change is the beginning of something bigger. The third level relates to the very essence of the institution's existence and the individuals within it, "where resistance to change is self-preserving". This is usually due to a conflict in the needs of management and the people directly affected by the change, a conflict of values, visions and needs, or a deep distrust across the organisation for the improvement of pedagogical competencies to achieve the desired results, in addition to the teachers' efforts, it is also essential that the school management supports them. The principal comes to the fore as both the pedagogical process leader and the school's main managerial element. Their task is to ensure that the staffing conditions for implementing education align with the school's needs, considering each teacher's specific needs and interests. At the same time, it creates an environment for sharing experiences and, in doing so, provides adequate support for novice teachers.

> "Teacher development and the whole process of teacher development is an essential part of the work of a good school. It is up to the principal to set optimal rules, use existing resources and convince their teachers that they can stand still in no area." (Trojan, 2012, p. 94)

5 Survey Methodology

The following text aims to present the survey results that focused on teachers' attitudes towards professional development, further education, and innovation. A particular vocational secondary school in South Moravia in the Czech Republic, focusing on gastronomy, was selected for the research. The aim was to answer the following research questions:

- What are the preferences and attitudes of teachers in further education?
- What motivates teachers to further their education and their professional development?
- What is the attitude of teachers towards innovation?
- Are there any differences in opinions between practical and theoretical teachers?

The survey was conducted via an electronic questionnaire and was a part of the bachelor thesis project (Vymazalová, 2022). In agreement with the principal, the composition and wording of the questions were designed so that the survey results could also serve as a basis for further school management and staff development planning.

The questionnaire was created on the Survio platform and was communicated via Microsoft Teams to all teachers in the school. A total number of 178 teachers were offered the opportunity to complete the questionnaire, including 102 theoretical teachers and 76 practical teachers. Data collection took place in the first half of April 2022. Fifty practical teachers and 67 theoretical teachers responded to the questionnaire. The overall return rate was, therefore, 65.7%.

5.1 Structure of Respondents

The youngest respondent from the teachers of practical teaching was 27 years old, and the teachers of theoretical teaching were 35 years old. The oldest respondent from the group of practical teachers was 65, and the group of theoretical teachers was 64. The average age of the practical teaching respondents was 47.3 years, and that of the theoretical teaching respondents was 52.4 years. Among the respondents, there were 93 females (79.5%) – of which 43 were practical teaching and vocational training (PTVT) teachers, 50 were vocational subjects (VS) teachers, 24 males (20.5%) – of which 7 were PTVT teachers, and 17 were VS teachers. A more detailed structure of respondents is given below. The most represented group among the respondents were teachers aged between 46 and 55. Half of the teachers of vocational subjects represented a similar age group—it could be said that among the respondents, ¾ were above 46.

Age	PTVT		VS		Total	
up to 35 years	7	14.0%	1	1.5%	8	6.8%
36 – 45 years old	13	26.0%	9	13.4%	22	18.8%
46 – 55 years old	19	38.0%	33	49.3%	52	44.4%
56 and over	11	22.0%	24	35.8%	35	29.9%
Total	50	100.0%	67	100.0%	117	100.0%

Table 2: Age structure of respondents

Among the teachers of theoretical vocational subjects, no one had less than a master's degree; one respondent even mentioned a doctoral degree. Among teachers of practical subjects, only about ¼ of the respondents had a master's degree and about 1/3 had a bachelor's degree.

Education	PTVT		VS		Total	
VC (vocational cert.)	7	14.0%	0	0.0%	7	6.0%
Secondary school (school-leaving cert.)	16	32.0%	0	0.0%	16	13.7%
University (Bachelor	16	32.0%	0	0.0%	16	13.7%
University (Master)	11	22.0%	66	98.5%	77	65.8%
University (Doctoral)	0	0.0%	1	1.5%	1	0.9%
Total	50	100.0%	67	100.0%	117	100.0%

Table 3: Highest educational attainment of respondents

Teachers of vocational subjects and teachers of practical teaching differed by the education they had acquired as part of their teaching qualifications. While teachers of theoretical subjects acquired their teaching qualification as part of their university education (86.6%),

teachers of practical subjects most often acquired their qualification for teaching through a further education course (68%).

	PTVT		VS		Total	
Master's degree in teaching from a faculty of education, philosophy, or science	15	30.0%	58	86.6 %	73	62.4%
pedagogy studies or studies in the field of education. sciences as part of lifelong learning	34	68.0%	9	13.4%	43	36.8%
I have not yet graduated or started studying	1	2.0%	0	0.0%	1	0.9%
Total	50	100.0%	67	100.0%	117	100.0%

Table 4: How did you qualify as a teacher?

In terms of length of teaching experience, the group with more than 20 years of experience was the most represented overall. The structure of the respondents from the two teacher groups differed from each other. More than two-thirds of the vocational subject teachers had more than 20 years of experience, while the practical teachers represented 42% of this group.

Length of experience	PTVT		VS		Total	
less than five years	13	26.0%	1	1.5%	14	12.0%
5 – 9 years	9	18.0%	1	1.5%	10	8.5%
10 – 14 years	1	2.0%	11	16.4%	12	10.3%
15 – 19 years old	6	12.0%	8	11.9%	14	12.0%
20 years and over	21	42.0%	46	68.7%	67	57.3%
Total	50	100.0%	67	100.0%	117	100.0%

Table 5: Length of experience of respondents

Interestingly, almost 3/5 of the teachers of theoretical vocational subjects entered the teaching profession immediately after graduating from university (58%), in contrast to the teachers of practical teaching, who most often entered the teaching profession after more than ten years in vocational practice (36%).

Start of the teaching career	PTVT		VS		Total	
immediately after graduation	2	4.0%	39	58.2%	41	35.0%
after 1 – 3 years of practice	8	16.0%	7	10.4%	15	12.8%
after 4 – 6 years of practice	14	28.0%	6	9.0%	20	17.1%
after 7 – 10 years of practice	8	16.0%	2	3.0%	10	8.5%
after more than ten years of practice	18	36.0%	13	19.4%	31	26.5%
Total	50	100.0%	67	100.0%	117	100.0%

Table 6: After how long in practice did you choose the teaching profession?

Vocational subjects (VS) teachers are likely to be very loyal employees, as 90% of them reported that the school they work at is the first in their teaching experience. Among vocational theory teachers, this school is first for only 25.6%.

School ranking in practice	PTVT		VS		Total	
first	45	90.0%	24	35.8%	30	25.6%
second	5	10.0%	22	32.8%	15	12.8%
third	0	0.0%	13	19.4%	7	6.0%
fourth	0	0.0%	7	10.4%	3	2.6%
fifth	0	0.0%	1	1.5%	2	1.7%
Total	50	100.0%	67	100.0%	117	100.0%

Table 7: Ranking of schools during teaching practice.

6 Survey results

6.1 Attitudes and Preferences in Further Education

The survey respondents were unanimous in that further education is essential for teachers. Only two vocational subjects (VS) teachers expressed the opposite view.

	PTVT		VS		Total	
yes, I consider further education to be an essential part of the teaching profession	48	96.0%	67	100.0%	115	98.3%
No, I do not think a graduate teacher needs further training	2	4.0%	0	0.0%	2	1.7%
Total	50	100.0%	67	100.0%	117	100.0%

Table 8: Do you consider further education to be important for teachers?

Overall, nine out of ten teachers responded that they were willing to further their education. A difference in reluctance was found between the two types of teachers, with 16% of practical teachers (PTVT) unwilling to undertake further training as opposed to 3% of vocational subjects (VS) teachers.

	PTVT		VS		Total	
Yes	42	84.0 %	65	97.0%	107	91.5%
No	8	16.0 %	2	3.0%	10	8.5%
Total	50	100.0 %	67	100.0%	117	100.0%

Table 9: Are you willing to further your education?

Approximately 36% of the respondents from among the teachers of vocational theoretical subjects (PTVT) participated in further education once in the past school year. In contrast, the same number of teachers of practical education participated in further education twice in the past school year. Similarly, 30% of the teachers of practical subjects declared that they had participated in training activities four times or more in the past school year, in contrast to only 15% of the teachers of theoretical subjects who declared participation in this volume. Teachers of vocational subjects did not participate in further training in 24% of cases, in contrast to teachers of practical subjects, where only 10% did not participate.

	PTVT		VS		Total	
1 x	4	8.0%	24	35.8%	28	23.9%
2 x	17	34.0%	10	14.9%	27	23.1%
3 x	9	18.0%	7	10.4%	16	13.7%
4 or more times	15	30.0%	10	14.9%	25	21.4%
at all	5	10.0%	16	23.9%	21	17.9%
Total	50	100.0%	67	100.0%	117	100.0%

Table 10: How many times did you participate in further education during the 2021/2022 school year?

Almost all respondents from the PTVT group (96%) consider non-formal types of education (courses, seminars, workshops, mentoring, etc.) the most beneficial. Teachers of vocational subjects considered this type of education as the most beneficial only from ¾; on the other hand, ¼ of the VS teachers also considered self-study beneficial.

	PTVT		VS		Total	
Other types of training (courses, seminars, etc.)	48	96.0%	49	73.1%	97	82.9%
Formal education (e.g., further education)	0	0.0%	2	3.0%	2	1.7%
Self-study	2	4.0%	16	23.9%	18	15.4%
Total	50	100.0 %	67	100.0 %	117	100.0 %

Table 11: Which type of further education do you find the most beneficial?

Both PTVT and VS respondents were basically in agreement about the preference for further education that is delivered outside the school premises. Overall, 78% of respondents expressed this view.

	PTVT		VS		Total	
Education outside school (lecture, seminar, workshop, round table, internship)	37	74.0 %	54	80.6 %	91	77.8 %

Training within the school (instruction, assisting, assignment, job rotation, mentoring, coaching, consultation)	13	26.0 %	13	19.4 %	26	22.2 %
Total	50	100.0 %	67	100.0 %	117	100.0 %

Table 12: Which method do you prefer in further education?

The face-to-face, i.e., in-class form of further education, is preferred more by teachers of practical education (82%) than by teachers of vocational subjects (72%). On the other hand, the distance form of further education is preferred by teachers of vocational theoretical subjects.

	PTVT		VS		Total	
distance	9	18.0%	19	28.4%	28	23.9%
F2F / in-class	41	82.0%	48	71.6%	89	76.1%
Total	50	100.0%	67	100.0%	117	100.0%

Table 13: Which form of further education do you prefer?

6.2 Motivation for Further Education

The two groups of teachers do not differ in their approach to seeking out professional development and training activities. Perhaps it could be stated that PTVT teachers are more passive and content with their employer's offer.

	PTVT		VS		Total	
Yes, I have selected quality providers	10	20.0%	16	23.9%	26	22.2%
Yes, because the employer's offers are insufficient	4	8.0%	5	7.5%	9	7.7%
I look for something now and then	21	42.0%	31	46.3%	52	44.4%
No, if I am to further my education, the employer must provide the offers	0	0.0%	1	1.5%	1	0.9%
No, because the employer's offers are sufficient	15	30.0%	14	20.9%	29	24.8%
Total	50	100.0%	67	100.0%	117	100.0%

Table 14: Do you search for offers for your own professional development?

Both groups of teachers agree that they are most motivated to further their education by the opportunity to learn something new. Practical teachers, however, are much more motivated by the opportunity to discuss practice problems with experts.

	PTVT		VS		Total	
The opportunity to discuss practice issues with experts	10	20.0%	4	6.0%	14	12.0%
Possibility of teaching another subject	2	4.0%	2	3.0%	4	3.4%
The possibility of employer reimbursement of training fees	2	4.0%	4	6.0%	6	5.1%
The opportunity to gain new insights into problem-solving when working with pupils	11	22.0%	14	20.9%	25	21.4%
The opportunity to learn something new in general	25	50.0%	43	64.2%	68	58.1%
Total	50	100.0%	67	100.0%	117	100.0%

Table 15: What would motivate you to participate in further education?

With minor differences, the two types of teachers do not differ in their view that the motivation of all staff in their workplace is at a medium level. However, many more PTVT teachers believe they are systematically motivated to perform better than VS teachers, who only share this view minimally.

	PTVT		VS		Total	
Motivation has a system that leads employees to high commitment	8	16.0%	1	1.5%	9	7.7%
Staff motivation is minimal	8	16.0%	11	16.4%	19	16.2%
Staff motivation is at a good level	11	22.0%	23	34.3%	34	29.1%
Staff motivation is on a medium level	21	42.0%	32	47.8%	53	45.3%
No importance is attached to staff motivation	2	4.0%	0	0.0%	2	1.7%
Total	50	100.0%	67	100.0%	117	100.0%

Table 16: How do you perceive the issue of employee motivation in your workplace?

Practical teachers are more likely (26%) than vocational teachers (15%) to believe that professional development is a matter for the teacher. On the other hand, 84% of VS teachers (as opposed to 74% of PTVT teachers) believe that professional development is a common concern of the school and the teacher.

	PTVT		VS		Total	
schools	0	0.0%	1	1.5%	1	0.9%
teachers	13	26.0%	10	14.9%	23	19.7%
teachers and schools	37	74.0%	56	83.6%	93	79.5%
Total	50	100.0%	67	100.0%	117	100.0%

Table 17: Do you think the teacher's professional development matters for the teacher or the school?

6.3 Innovation in Education

Respondents differed in their views on the school management's support of innovation among teachers. PTVT teachers declared twice as much (48%) that innovation is supported by the school management if necessary, as opposed to VS teachers (24%). The teachers of vocational theoretical subjects expressed that 72% believe management highly values innovation. PTVT teachers shared this opinion only 42%.

	PTVT		VS		Total	
Innovation is only encouraged by management when necessary	24	48.0%	16	23.9%	40	34.2%
The school management highly values innovation	21	42.0%	48	71.6%	69	59.0%
The school is a leader in innovation thanks to its leadership	5	10.0%	3	4.5%	8	6.8%
Total	50	100.0%	67	100.0%	117	100.0%

Table 18: In your opinion, to what extent does the school management encourage innovation among teachers?

The attitudes of vocational and practical teachers are relatively similar in their approach to innovation in teaching. There was no significant difference between the responses to this question. More than half of the respondents believe that innovation is possible and desirable.

	PTVT		VS		Total	
Innovation is needed everywhere I look	8	16.0%	12	17.9%	20	17.1%
I am convinced that innovation is not only possible but desirable	29	58.0%	36	53.7%	65	55.6%
I do not bother whether innovation comes along, I adapt	12	24.0%	14	20.9%	26	22.2%
I am not in favour of introducing “novelties”; I stick to traditional methods	0	0.0%	5	7.5%	5	4.3%
changes are, in my opinion, unwanted, unnecessary and often dangerous	1	2.0%	0	0.0%	1	0.9%
Total	50	100.0%	67	100.0%	117	100.0%

Table 19: What is your attitude towards innovation in teaching?

7 Summary and Conclusion

The paper aimed to identify and describe the differences between the two groups of teachers who most often work in secondary vocational schools in the Czech Republic. Our research has shown differences between teachers of vocational theoretical subjects and teachers of practical teaching in terms of initial formal education and ways of obtaining a teaching qualification, as well as in attitudes and preferences related to their professional development and further education. While teachers of vocational subjects almost always have a master's degree, which includes a teaching qualification, teachers of practical teaching most often have a bachelor's degree or less. They had obtained their teaching qualification through courses. Czech legislation allows both options. Practical teachers are relatively more reluctant to undertake further training. However, on the other hand, they were twice as likely to have received training during the last school year than teachers of theoretical vocational subjects. Both groups of teachers considered non-formal training (courses, seminars) conducted outside the school premises more beneficial. Teachers of vocational subjects preferred self-study and distance learning to a much greater extent. Practical teachers were much more motivated than vocational teachers to further their education by the opportunity to discuss their problems with practice experts. Unlike their colleagues, the vocational teachers felt that no system in their school motivated them to work harder. On the other hand, vocational subject teachers were significantly more optimistic about the support for innovation from the school management.

The attitudes of both groups of teachers focused on their approach to innovation, e.g., in teaching, was almost identical – more than half of the respondents declared that innovation was possible and desirable. Although the survey was conducted in only one school and the sample exceeded one hundred respondents, we believe the results provide an exciting starting point for further exploration of this issue, as teaching staff in vocational education deserve their attention and support.

References

Adamec, P. (2019). Vztah a motivace učitelů odborných předmětů k dalšímu vzdělávání [Attitude and motivation of teachers of vocational subjects towards further education]. *Pedagogika*, *69* (2), 165-184. https://doi.org/10.14712/23362189.2018.862

Aišmanová, A., & Novotná, L. (2009). Analýza zátěžových faktorů v učitelské profesi [Analysis of stress factors in the teaching profession]. In J. Miňhová (Ed.), *Psychologie ve vzdělávání učitelů a v jejich profesní činnosti* [Psychology in teacher education and professional activity] (pp. 136-137). Plzeň: Západočeská univerzita v Plzni.

Czech Republic. (2004). Zákon č. 563/2004 Sb., o pedagogických pracovnících a o změně některých zákonů [Act No. 563/2004 Sb., on pedagogical staff and on amendments to certain acts]. www.msmt.cz

Czech Republic. (2005). Vyhláška č. 317/2005 Sb., o dalším vzdělávání pedagogických pracovníků, akreditační komisi a kariérním systému pedagogických pracovníků [Decree No. 317/2005 Sb., on further education of pedagogical staff, accreditation commission and career system of pedagogical staff]. www.msmt.cz

Eggert, M. (2005). *Motivation* [Motivace]. Praha: Portál.

Havlík, R. (1999). Profesní „kariéra“ a další vzdělávání v názorech a postojích učitelů [Professional “career” and further education in teachers‘ opinions and attitude]. *Pedagogika*, *49* (2), 147-155. https://pages.pedf.cuni.cz/pedagogika=

Kohnová, J. (2012). Modely dalšího vzdělávání učitelů v historii českého školství [Models of teacher training in the history of Czech education]. In J. Kohnová, et. al. *Profesní rozvoj učitelů a cíle školního vzdělávání* [Professional development of teachers and the goals of school education] (pp. 21–36). Praha: Fakulta pedagogická, Univerzita Karlova.

Krojzlová, H. (2007). Problematika DVPP – problém nás všech [DVPP – a problem for all of us]. In J. Kohnová, & Macháčková, I. (Ed.). *Další profesní vzdělávání učitelů a jeho perspektivy* [Further professional education of teachers and its perspectives]. Proceedings of the conference on the 60th anniversary of the Faculty of Education, Charles University (pp. 129-130). Prague: Faculty of Education, Charles University.

Kyriacou, Ch. (1996). *Klíčové dovednosti učitele: cesty k lepšímu vyučování* [Essential teaching skills: pathways to better teaching]. Praha: Portál.

Lazarová, B. (2005). Psychologické aspekty profesionálního rozvoje učitelů: Rezistence vůči změně. [Psychological Aspects of the Professional Growth of Teachers: Resistance to Change]. *Pedagogika*, *55* (2), 102-118. https://pages.pedf.cuni.cz/pedagogika/

Lazarová, B. (2011). Učitelé v pozdní fázi kariéry – z výzkumných dat [Late-career teachers – from research data]. In B. Lazarová et al. *O práci zkušených učitelů* [On the work of experienced teachers] (pp. 107-148). Brno: Paido.

Lazarová, B., & Prokopová, A. (2004). Učitelé a jejich další vzdělávání: k některým psychologickým aspektům [Teachers and Their Further Education: Certain Psychological Aspects]. *Pedagogika*, *54* (3), 261-273. https://pages.pedf.cuni.cz/pedagogika/?p=1812&lang=cs

Lukas, J. (2007). Vývoj učitele: Přehled relevantních teorií a výzkumů (1. část) [Teacher development: a review of relevant theories and research (part 1)]. *Pedagogika*, *57* (4), 364-379. https://pages.pedf.cuni.cz/pedagogika/

Maršíková, M., & Jelen, V. (2020). *Hlavní výstupy z Mimořádného šetření ke stavu zajištění výuky učiteli v MŠ, ZŠ, SŠ a VOŠ* [Main outputs of the exceptional inquiry into the state of teaching provision by teachers in kindergartens, primary secondary schools]. Praha: Ministerstvo školství, mládeže a tělovýchovy ČR. https://www.pedagogicke.info/2019/05

Průcha, J. (Ed.). (2009). *Pedagogická encyklopedie* [Pedagogical encyclopedia]. Praha: Portál.

Průcha, J., Walterová, E., & Mareš, J. (2013). *Pedagogický slovník* [Pedagogical dictionary]. Praha: Portál.

Rabušicová, M., Rabušic, L., & Šeďová, K. (2008). Motivace a bariéry ve vzdělávání dospělých [Motivation and barriers in adult education]. In Rabušicová, M., & Rabušic, L. (Eds.). *Učíme se po celý život?: o vzdělávání dospělých v České republice* [Learning throughout life?: on adult education in the Czech Republic] (pp. 97-112). Brno: Masarykova univerzita.

Spilková, V. (2010). Kvalita učitele a profesní standard [Teacher quality and professional standards]. In V. Spilková et al. *Kvalita učitele a profesní standard* [Teacher quality and professional standard]. (pp. 21-56). Praha: Pedagogická fakulta, Univerzita Karlova.

Starý, K., Dvořák, D., & Greger, D. (2012). *Profesní rozvoj učitelů* [Professional development of teachers]. Praha: Karolinum.

Světlík, J. (2006). *Marketingové řízení školy* [Marketing management of schools]. Praha: ASPI.

Toužilová, M. (2016). Co to vlastně je DVPP? [What is DVPP?] https://epale.ec.europa.eu

Trojan, V. (2012). Ředitel školy – Rozhodující činitel v procesu rozvoje učitelů School [Principal – A decisive factor in the process of teacher development]. In J. Kohnová. (Ed.). *Profesní rozvoj učitelů. Sborník příspěvků z konference* [Professional development of teachers. Proceedings of the conference] (pp. 90-94). Praha: Pedagogická fakulta, Univerzita Karlova.

Vránová, Š. (2013). Motivace učitelů – vysokoškolsky vzdělaných zaměstnanců v neřídících pozicích [Motivating teachers University-educated employees in non-managerial posts]. https://docplayer.cz

Vymazalová, Z. (2022). *Profesní rozvoj učitelů praktického vyučování* [Proffesional Development of Teachers of Practical Teaching]. Mendelova univerzita v Brně. https://is.mendelu.cz/zp/

Preparation of Future Teachers for Measuring Technical Quantities

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DOI: https://doi.org/10.53349/resource.2023.is1.a1187

Abstract

In addition to acquiring pedagogical and methodological competencies, preparing future teachers of scientific subjects is also focused on acquiring practical skills of students from various technical fields. One of these fields is the measurement of technical quantities. The paper presents the methodological basics necessary for the preparation and implementation of environmental temperature measurement and the results of the measurements obtained by the students. Two thermometers were used to measure the temperature. The classical thermometer measured the air temperature, and a spherical thermometer measured the radiation temperature of the same environment. The obtained data were evaluated using methods of descriptive statistics, and the whole experiment was also assessed from the point of view of measurement methodology. The data obtained from the measurements of both thermometers showed differences, allowing the students to understand the difference between air and radiant temperatures.

Keywords: Measurement methodology, Didactics of scientific subjects, Temperature measurement

1 Introduction

Practical work, including laboratory work, has been part of science education for more than a century and is considered essential in teaching science and technical subjects. In his research, author Tetsuo Isozaki (2017) concluded that practical work (including laboratory work) should be considered a way to achieve a conclusion – not a conclusion. In this case, sufficiently educated teachers in science and pedagogy act as facilitators who support students in

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learning. Without enthusiastic teachers, using high-quality equipment fully and designed laboratory measurements are impossible. Thus, when doing practical work, the emphasis should be on its purpose and what students can learn from the experience – not just on the activities they perform while doing such work. This idea is also confirmed by the author Yap, who expressed that vocational education and training require integrating knowledge with practical skills (Yap et al., 2022). It is also necessary for students to engage in scientific research as part of laboratory work and for teachers to guide them to search for solutions, design experiments, formulate hypotheses, observe, organise data and provide explanations.

One of the goals of the laboratory teaching of Physics (as well as other science and technical fields) is to help students connect theory with practice. Experiments are often chosen to "demonstrate" particular concepts. Students are expected to approach phenomena scientifically, so they should develop a hypothesis and plan their experiments accordingly. Although it is not usually explicitly stated, these learning objectives require students to have conceptual knowledge before experimenting. Otherwise, they could not connect theory with practice or develop a hypothesis. Empirical evidence from process studies of university students' laboratory activities suggests that students rarely express their conceptual knowledge during practical work. Instead, experiments appear to be how students discover and "stabilise" conceptual understanding in learning Physics (Aufschnaiter, C. & Aufschnaiter, p.9, 2007).

Students' laboratory work is also one of the effective methods of teaching creative thinking. It is an essential process in learning science and technical subjects because students tend to have difficulty understanding basic concepts if they are only taught verbally. Students will gain a better understanding of the subject matter when they are given real-life examples, and at the same time, they can learn these concepts through laboratory work. Khoiri et al. conducted research that measured students' creative thinking skills. Creative thinking skills were measured based on four indicators: flexibility, fluency, originality and detail. Research results show that laboratory work improved students' fluency and thinking skills (77% of students showed improvement). It was also suitable for improving students' original thinking, with 84% of students improving (Khoiri et al., 2017).

We see that practical measurements of students have an outstanding contribution to the learning of students as well as to the development of their creative thinking. For students of technical fields, they are also an essential part of acquiring competencies in the field of working with measuring devices. Students at technical schools must know what measurements are performed on different types of mechanisms and how to do them. Teachers can use either analogue measuring devices or modern digital devices. Research done by several authors shows that older devices for measuring technical quantities are more beneficial for students not only for understanding the principle of measurement but also for understanding the structure of the measuring device (Macko et al., 2019).

Laboratories have been an essential part of academic education for a long time. However, the requirements for physical, chemical, and technical education have changed. However, while seminars and lectures are easily updated and adapted to new knowledge, modernised courses

focused on work in the laboratory or practical measurements are much more complex: simple content changes require new expensive equipment, and strict course schemes do not allow for significant structural changes (Neumann, K., & Welzel, M., 2007). Therefore, the innovation of laboratory exercises for students greatly benefits every scientific field.

2 Choice of Measurement and Measuring Devices

In this article, we will show how it is possible to implement practical activities focusing on measuring technical quantities in the selected study program. The practical measurement was prepared for students and future teachers of Technology. The Teaching of Technology study program is a program of the second level of university education. By completing it, students receive the title of "master" (Mgr.). It follows on from the Bachelor's study program Teaching Practical Training. The full-time study is two years; in the external form, it is three years. Graduates of this study program will acquire deep theoretical knowledge about the fundamental factors and processes of socialisation and education, the cultural context of anthropogenesis and its psychological interpretations. They master the contents of general education and the contents of the disciplines of their specialisation, and the principles of their structure. They are familiar with the methodology of the field and its broader cultural and social contexts. They can handle this content as a product of human (scientific) activity, and in this context, they can project it for didactic purposes. During their studies, students acquire adequate knowledge of the organisation and management of education and research and development methods in pedagogy.

While preparing for their future profession, students of Teaching Technology need to acquire the necessary competencies in pedagogy and departmental didactics and necessary skills in practical activities such as laboratory or technical measurements. They can acquire these competencies only if they design and implement measurements themselves under the guidance of a teacher during their undergraduate training. Therefore, when preparing future teachers, guiding students to carry out such activities with their students in pedagogical practice is necessary.

First, choosing a suitable practical task is necessary, a measurement for which the student must prepare accordingly. Such preparation mainly consists of mastering the theory necessary for practical measurement. These are the physical, technical, mathematical and statistical foundations necessary for a specific measurement. An equally important aspect is the preparation of the equipment itself needed for measurements. We are talking about the correct selection of measuring devices and measuring probes. Next comes the measurement, which is recorded and evaluated in measurement protocols.

The article presents an example of measuring the temperature of the working environment, in which the Technical Teaching department students measured the working environment's temperature with a classic thermometer and a globe thermometer. A globe thermometer is a device that can measure the temperature of the working environment when the worker's

thermal well-being can be affected by, for example, airflow. Other factors, such as cold room walls, can also influence the ambient temperature. The reason may be the beginning of the heating season. The air temperature and the radiant temperature of the walls can therefore influence the final temperature in the room. Similarly, such temperature difference can be seen if a heat source in the room affects the ambient temperature. A globe thermometer is a thermometer that can record such an effect. A globe thermometer of the Vernon-Jockl type and a standardised thermometer according to the STN ISO 7726 standard is used. This thermometer consists of a copper ball with a diameter of 150 mm. The surface of the ball is covered with black paint. A thermocouple is placed inside the thermometer, usually connected to a device that records the temperature. This task was chosen so the students discover that two thermometers, designed to measure the temperature in the same environment, will ultimately record different values.

3 Measuring the Temperature of the Working Environment with a Globe and Classic Thermometer

During the practical lessons on Measurements and Measuring Instruments, the Teaching of Technology program students measured the working environment's temperature. The temperature of the working environment was affected by an electrical appliance, an electric stove with four plates. In the case of this measurement, the aim was to show the temperature change measured with a classic thermometer and a globe thermometer. The air temperature was measured using a device that recorded the temperature of the dry thermometer and air humidity. Anemometer/Psychrometer AN 340 (Figure 1) recorded these values. It is a device commonly used to measure microclimate values such as airflow velocity, air temperature, wet bulb temperature, relative humidity, and dew point temperature.

Fig. 1: Anemometer/Psychrometer AN 340

At the same time, the radiation temperature was also measured with a globe thermometer. This device recorded the temperature of the working environment affected by the radiant heat emitted by the electric stove. A Testo 435 measuring device with an attached globe thermometer probe was used (Figure 2). The location of the probe of the globe thermometer was at a distance of 50 cm from the edge of the stove. An Anemometer/Psychrometer probe AN 340 was also placed in this place.

Fig. 2: Location of the globe thermometer probe

The measurement was carried out on October 11, 2021, in a room with an electric stove with four plates switched on for 30 minutes. During this time, air temperatures, air relative humidity and the temperature of the globe thermometer were recorded at 5-minute intervals. After 30 minutes, the electric stove was turned off, and the temperature was recorded for another 30 minutes. The measured values are shown in Table 1. The values in the table marked in bold are the data measured when the stove was turned off.

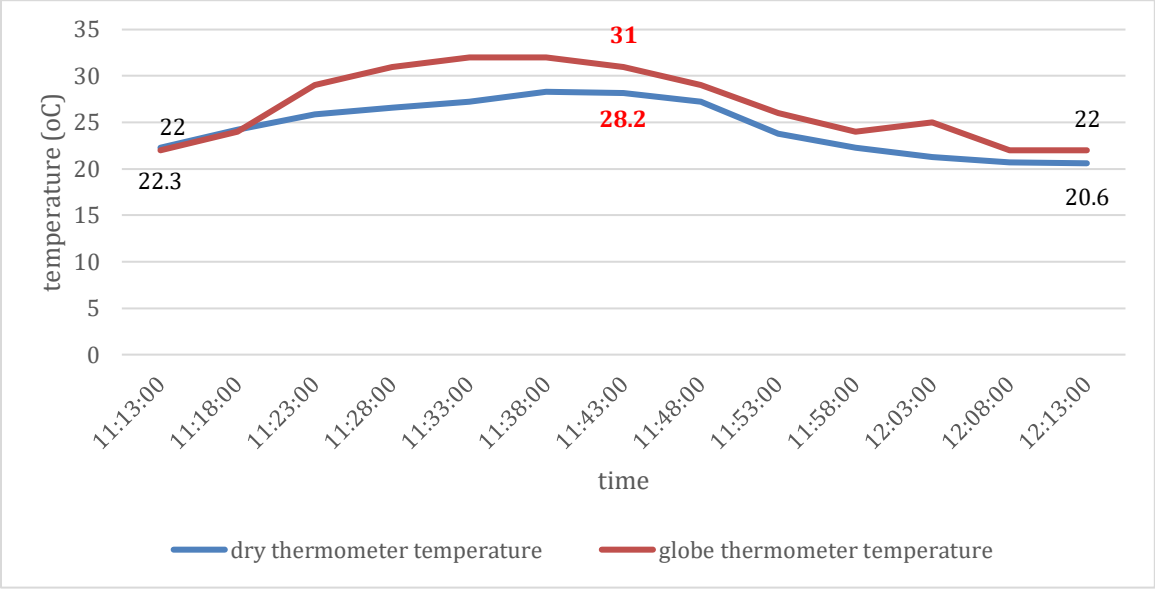
time	dry thermometer temperature (°C)	globe thermometer temperature (°C)	temperature differences (°C)	relative air humidity (%)
11:13:00	22.3	22	-0.3	48.5
11:18:00	24.2	24	-0.2	48.4
11:23:00	25.9	29	3.1	26.6
11:28:00	26.6	31	4.4	23.3
11:33:00	27.2	32	4.8	22.1
11:38:00	28.3	32	3.7	21.1
11:43:00	**28.2**	**31**	**2.8**	**21.1**
11:48:00	27.2	29	1.8	21.9
11:53:00	23.8	26	2.2	28.8
11:58:00	22.3	24	1.7	29.5

12:03:00	21.3	25	3.7	32.8
12:08:00	20.7	22	1.3	34
12:13:00	20.6	22	1.4	33.5

Table 1: Values of temperatures and relative air humidity

Figure 3 compares the measured values of the dry thermometer, the globe thermometer, and the relative humidity of the air. The graphs show the initial and final values from the measurement. The red colour showed the values when the electric stove was turned off. From the progress of the temperatures of the dry and globe thermometer, it is clear that the temperature of the working environment can be significantly influenced by the heat source, which in this case was an electric stove. The most significant difference between the dry and spherical thermometer temperature was recorded at 11:33 when this difference was up to 4.8°C.

Comparing the progress of temperatures and relative air humidity, it was possible to observe a significant decrease in relative humidity only ten minutes after switching on the stove. In this case, the relative humidity in the room dropped from 48.5% to 26.6%. After this change, the humidity dropped even further to the lowest value of 21.1% at 11:43, when the stove was turned off. From this moment, the relative humidity of the air started to rise again. At the end of the measurement, it reached a value of 33.5%.



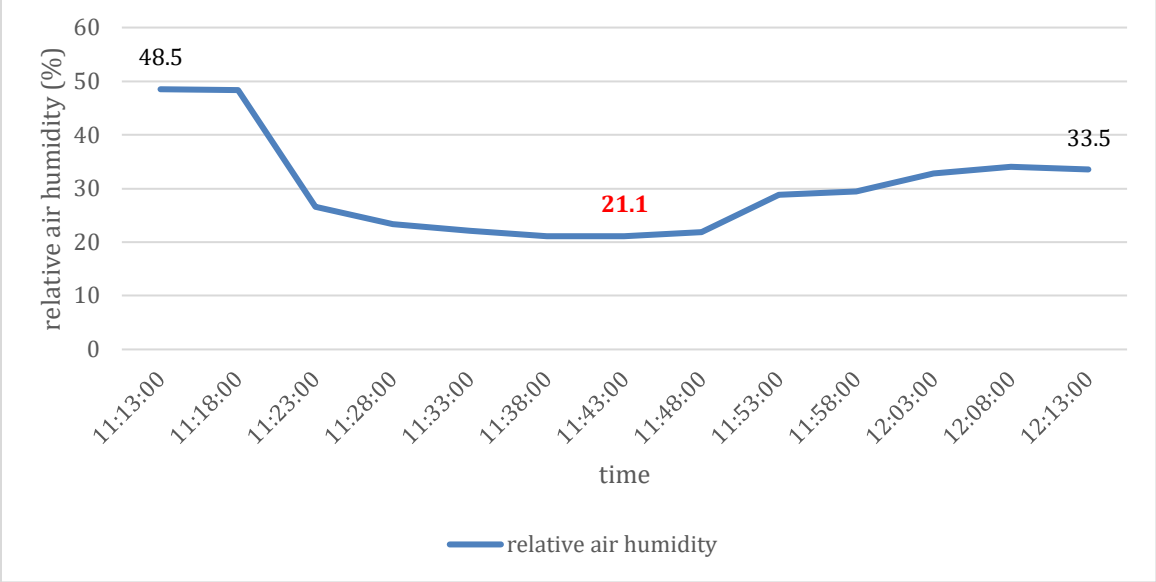


Fig. 3: Progress and comparison of measured values

4 Discussion

The measurement aimed to highlight the differences in the data obtained by measuring with a dry and globe thermometer. At the same time, students had the opportunity to acquire the necessary skills in processing measured data into protocols.

This measurement enabled the students to mainly perceive the differences between the temperature of a dry globe thermometer and the relative humidity of the air. This phenomenon is also often seen when the recorded temperature of the globe thermometer is lower than the temperature of the dry thermometer. For example, at the beginning of the heating season, when the heating element (radiator, fireplace, stove, etc.) warms the air in the room, the spherical thermometer shows lower temperature values because the surrounding walls need some time to accumulate the heat.

The students performed the measurements by working in two groups. The first group (7 students) focused on measuring the temperature with a dry thermometer, and the second group (7 students) recorded the temperature with a globe thermometer. Then, they shared the measured data. They wrote a protocol for the measurement, which had to be made in the following form:

Theoretical foundations of measurement: This part should describe temperature as a physical quantity and technical assurance of measurements, such as devices, legislative regulations, and technical standards.

Description of the measuring device (description and explanation of the construction): In this part, they described the environment where the measurement took place with the location of the measuring devices.

Method used: The accuracy of each measurement depends on the method used. The students had to determine and describe what measurement method it was.
Measurement procedure: Writing a brief but concise description of the measurement in the protocol was necessary.
Measured data: This part should contain all calculations, partial and central measured values, tabular expressions, units, and graphs.
Measurement evaluation and conclusion: In this part of the protocol, it was necessary to evaluate the measurement results themselves and to be able to interpret them about legislative regulations.

The qualitative analysis of the fourteen submitted protocols can conclude that the most frequent mistakes in the protocols were in the theoretical parts of the measurement. Formal errors like incorrectly defined units and their quantities often occurred in theory. The description of the instruments was often very brief. There was no indication of the accuracy of the instruments. Students do not always realise that such records of measurements need to be made so that anyone who repeats such measurements as described in the protocol should get the same results. It is the elementary basis of every scientific work.
A frequently repeated error was also the incorrectly selected graph type. Since the temperature was recorded over time, it was necessary to choose a line graph. In one protocol, the student chose a column type of graph to present the results.

The most significant lack of information occurred in the measurement evaluation section, where students often neglected to compare their measured data with the data established by legislation (decrees, standards). The students' conclusions based on the measurements were often just a dry statement of the measured data without a deeper analysis.

4.1 Conclusion

The article's results and evaluations of the student's activities show that simple measuring devices and methods can ensure a discovery approach to acquiring new knowledge and skills. In the current digital era, devices are used every day, which minimises the error of the observer and the experimenter but, at the same time, suppresses the creative approach to a certain extent. Digital devices reduce the demands on user knowledge and skills of experimenters. In our case, the difference in the measured values could have surprised the students. Two thermometers, placed in the same environment, at the same place at the same time, recorded different values. When analysing the measured values, students are forced to look for the causes of the difference. The experiment experience will help to remember better and understand the given issue. Our set concept of temperature measurement confirms the findings of Mack et al. l. that older measurement methods of technical quantities are more suitable for students not only for understanding the principle of measurement but also for

understanding the structure of the measuring device and, thus also, the obtained results (2019).

References

Aufschnaiter, C., & Aufschnaiter, S. (2007). New Roles of Student Labs and Project Work. In *European Journal of Physics*. *28* (3). https://doi.org/b686d3

Dennekamp, M., Mehenni, O., Cherrie, J., W., & Seaton, A. (2002). Exposure to Ultrafine Particles and PM2.5 in Different Micro-Environments. *Annals of Occupational Hygiene*, *46*, Supplement 1, pp. 412 – 414.

Isozaki, T. (2017). Laboratory work as a teaching method: A historical case study of the institutionalisation of laboratory science in Japan. Espacio, *Tiempo y Educación*, *4* (2), 101-120. http://dx.doi.org/10.14516/ete.177

Khoiri, N., Riyadi, S., Kaltsum, U., Hindarto, N., & Rusilawati, A. (2017). Teaching Creative Thinking Skills with Laboratory Work. In *International Journal of Science and Applied Science: Conference Series*, *2* (1), pp. 256 – 260. https://doi.org/10.20961/ijsascs.v2i1.16722

Macko, M., Krist, Z., Cervenka, M., Racek, F., & Balaz, T. (2019). Understanding the Principles of Measuring of Technical Quantities Using Older and New Measurement Methods. In *INTED 2019*. p. 9223-9226, ISSN 2340-1079.

Mukhambetova, M., Meruert, S., Kultan, J., & Schmidt, P. 2018. Possibilities of Using Microsoft Azure in the Content of Higher Education. In *SCHOLA 2018:14th International Conference on Engineering Pedagogy*, *14*, p. 104 – 110.

Neumann, K. & Welzel, M. (2007). A new labwork course for physics students: Devices, Methods and Research Projects. In *European Journal of Physics*. *28* (3). https://doi.org/bpgsb6

W. Akili. (2015). On the Role of Adjuncts in Engineering Education: Developing Practical Courses and Solving Real World Problems In *122nd ASEE Annual Conference & Exposition, Paper presented at 2015 ASEE Annual Conference and Exposition*, Seattle Washington, 0.18260/p.24536.

Yap, J. B. H., Hew, Q. L. T., & Skitmore, M. (2022). Student Learning Experiences in Higher Education: Investigating a Quantity Surveying Programme in Malaysia. *Construction Economics and Building*, 22:1, pp. 1–20. https://doi.org/10.5130/AJCEBv22i1.7835, ISSN 2204-9029.

Záhorec, J., Hašková, A., & Bílek, M. (2014). Impact of multimedia-assisted teaching on student attitudes to science subjects. *Journal of Baltic science education*, *13* (3), p. 361-380.

Záhorec, J., Hašková, A., & Munk, M. (2014). Assessment of selected aspects of teaching programming in SK and CZ. In *Informatics in Education*, 2014, *13* (1), pp. 157-178.

Development of In-Service and Pre-Service Vocational School Teachers' Key Competencies in Accordance with the Digital and the Green Transformation of the Economy

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DOI: https://doi.org/10.53349/resource.2023.is1.a1188

Abstract

The proposed paper reflects on the European Commission's recommendations targeted at accessible, more attractive, and flexible vocational training. An emphasis is placed on an active and conscious collaboration of the actors of the educational practice, and attention is paid to undergraduate teacher training and the efforts to increase the interest in developing professional and key competencies through the digital and green transformation of the economy. The paper is based on the European Commission's declared commitments, presented in the European Green Deal in 2019 (European Commission, 2019) as a challenge to eliminating existential environmental threats. For its application in practice, teachers' sufficient knowledge in developing knowledge, skills, and pro-environmental attitudes in their students is essential. Additionally, attention is paid to the document 'Council Recommendation on Key Competencies for Lifelong Learning' adopted by the European Council, which committed each Member State to implement it in its curricular documents. On the application level, the paper is focused on vocational schoolteachers' preparedness for accomplishing demanding tasks and on promoting their undergraduate training by utilising appropriate teaching methods and strategies.

Keywords: Environmental education, the European Green Deal, lifelong learning, Key competencies, Curricular documents, Undergraduate teacher training

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1 Introduction

Education in the field of environmental awareness is currently based on two major international agreements impacting both the content and the methods in the context of environmentally oriented activities in school environments. Recently, the awareness of the significance of climate change's impact on the environment and, subsequently, on human health and lives has increased in broader masses. The first important document to be mentioned is the European Green Deal (European Commission, 2019), which aims to achieve climate neutrality on the horizon of 2050. Alongside the necessary changes in all branches of the economy, as well as in the applied approaches, and taking over personal responsibility for meeting this goal, also high-quality training is essential. It must be remembered that the graduates will be the future actors in the changing world. In this context, the second crucial international agreement, 'Council Recommendation on Key Competences for Lifelong Learning' (2019) – which aims to create a system for developing critical competencies in learners – has a big role. Developing a functioning model requires numerous extensive research activities on identifying the critical knowledge, skills, abilities, and attitudes, as well as values (Zapletal et al., 2018; Zapletal, 2020), which are among the essential employers´ requirements and are necessary for successfully dealing with professional tasks (Szarková & Horváth, 2016), but on the other hand, also employees consider them essential in the process of achieving personal life satisfaction. The European Commission encourages all EU Member States to implement this model in their curricular documents. It is crucial not to focus exclusively on knowledge and professional skill, but especially on interdisciplinary transferable competencies that provide a basis for further learning activities and self-realisation. It should be considered that developing teacher trainees' key competencies during undergraduate training has a significant impact on their expertise and professional preparedness for performing their jobs in schools, where they can also hold the position of a class teacher, coordinator of environmental education, or school counsellor, i.e., will become essential determinants in shaping the young generation's opinions, attitudes, and their system of values.

2 Sustainable Development as a Part of Environmental Education

People are becoming more aware of the importance and need for sustainable actions and responsible and respectful behaviour towards the environment. The requirements have been clearly defined, and information regarding the up-to-date levels of its pollution is easily accessible. Although the environmental burden is enormous, protecting the environment is on the periphery of interest within formal education in Slovakia.

Considering the environment's condition, educational systems should react to the situation more flexibly, prepare the future generation for the challenges they will face, and pay sufficient attention to environmental education. In Slovakia, in Act No. 17/1992 Coll. on Environment, it is stated that education and edification should lead learners towards thinking and acting by the principle of sustainable development, towards feeling responsibility for maintaining the quality of the environment and its components and developing respect for life in all its forms. Alongside that, in the Act on Environment, the notion of sustainable development is defined as such development which allows present and future generations to satisfy their basic needs and, at the same time, does not reduce the diversity of nature and preserves the natural functions of ecosystems. Krajňáková (2020) considers environmental education the only intentional, purposeful educational process representing the "good" in society, which intends to form ecological culture and promote the rational use of resources. It can be characterised as a sum of gained knowledge, habits, value orientation, experiences, and competencies in protecting the environment to ensure environmental security in the country and the entire planet.

The process of environmental education often comes with an increase in students' academic performance, more effective critical thinking, and soft skill development. It also comes to personal growth (Natural England, 2012, as cited in IEP, 2021). The above supports the idea of implementing environmental education in formal education.

2.1 Topics of the European Green Deal and the Proposal for Council Recommendation on Learning for Environmental Sustainability

For the above reasons, on the platform School Education Gateway, public discussions about education in the field of environmental sustainability organised by the European Commission were led. The gathered ideas resulted in the 'Proposal for a Council Recommendation on Learning for Environmental Sustainability' (European Commission, 2022). This document aims to strengthen the collaboration in environmental sustainability and education at a European level in compliance with the European Green Deal (European Commission, 2019) in the European educational environment. Based on the European Green Deal, the European Union has adopted specific measures against climate change and encourages all citizens to strive for a more ecological and sustainable Europe (School Education Gateway, 2021).

The European Green Deal aims to promote changes in the following fields:

- innovations in the industry – more ecological industry, sustainable and more ecological production cycles;
- moving towards a circular economy;
- developing clean technologies;
- more ecological and sustainable transport;
- decarbonisation of the energy sector – clean energy;
- increasing the energy efficiency of buildings – more ecological construction;
- protecting our biodiversity and ecosystems;

- ensuring fast and effective air, water, and soil pollution reduction;
- sustainable agriculture (European Commission, 2020).

The Recommendation on Learning for Environmental Sustainability can support Member States in their efforts to unify their education and vocational training systems with the changes necessary for the green transition.

2.2 Implementation of Environmental Education in Formal Education in the Slovak Republic

The Slovak national curricula and other significant educational documents include environmental education, education on sustainability and global education. However, it can be assumed that the terminology in the field is not clearly defined.

Following the national curricula for different types and levels of schools, environmental education can be realised in the form of a cross-cutting theme, as a school subject, as a theme included in the educational content of any school subject, or the form of a course or a project. It must be noted that most frequently, schools opt for implementing the content of environmental education in several school subjects in combination with participation in environmental projects and organising environmental activities. Educational standards represent a problem for schools, as these are defined only for individual subjects and not for cross-cutting themes – including environmental education. Differences between schools can be observed mainly in how much they collaborate with non-governmental organisations and participate in projects and grant projects.

The Ministry of Environment of the Slovak Republic is responsible for increasing environmental awareness in Slovakia and ensuring informal environmental education. In 2015, as a reaction to the current needs and latest challenges in the field of environmental protection in Slovakia, a new concept for environmental education by 2025 was adopted. Its main goal is to develop a functioning system of environmental education and edification in the environmental resort following several primary international documents focused on environmental education and edification (Ministry of Environment of the Slovak Republic, 2015). The currently applied system is insufficient, and there is a need for a more practical approach to environmental education.

2.3 The Inclusive Dimension of Environmental Education

Environmental education also impacts learners' personal development, which applies explicitly to socially disadvantaged groups of learners. Experiential strategies and teaching methods can significantly contribute to disadvantaged students' personal growth and increase the quality of their lives. Booth and Ainscow (2019, p. 41) claim that environmental sustainability forms the bases for inclusion, as environmental degradation, deforestation, and global warming influence the quality of our lives and even today endanger human lives

worldwide. Schools promoting inclusive education should pay attention to environmental protection in their closest neighbourhood and outside it. When developing ecological literacy, they should lead their students towards respecting nature and understanding its processes instead of emphasising the eventuality of future catastrophes. Environmental education must be associated with hope and optimism regarding overcoming threats. The critical approaches to education based on inclusive values are displayed in Figure 1.

Fig. 1: Pro-inclusive education (Booth & Ainscow, 2019)

3 Council Recommendation on Key Competences for Lifelong Learning

The Council Recommendation on Key Competences for Lifelong Learning was adopted by the European Commission in 2018 and committed to all EU Member States implementing it in their national curricular documents. As stated in the document, education aims to equip all students with a basic set of key competencies at an acceptable level, which they can achieve and allow them access to further education and finding application in society. The Council Recommendation is an essential document as it promotes increasing the quality of school education to prepare flexible and creative people equipped with key competencies necessary for living meaningful and successful lives and for understanding the importance of lifelong learning. Developing key competencies is a lifelong process and among the rights of every human being. Personal satisfaction, a healthy and sustainable lifestyle, social inclusion, active citizenship, high-quality and inclusive education, vocational training, and lifelong learning opportunities are essential (Key Competencies for Lifelong Llearning, 2020).

Suppose education is perceived as an opportunity for acquiring and developing competencies regardless of the education the learners need. In that case, the need to focus

on universal, flexible, and sustainable competencies increases. So, within educational systems, opportunities for stimulating learners to further learning and gaining new knowledge, developing skills, abilities, and attitudes necessary for motivation to learn, achieving success and overall progress should be created.

The above facts led the European Council to provide a common reference framework on key competencies for all education stakeholders in May 2018 (European Council, 2018). In the adopted Recommendation, eight key competencies needed for lifelong learning are defined today and in the future. As stated in the document, eight key competencies are necessary for individuals' personal development, health, sustainable lifestyle, employability, active citizenship, and social inclusion. The reference framework also includes recommendations on effective ways of promoting the development of innovative approaches in education, methods of assessment and providing support and guidance for people working in the field of education. Its main goal is to achieve the potential of personal development in all learners. It is necessary to ensure high-quality education and care since early childhood, to improve the quality of educational systems, including the whole spectre of schools from primary to vocational education, and to modernise universities.

The eight key competencies (European Council Recommendation) are displayed in Fig. 2.

Fig. 2: Eight basic key competencies (European Commission, 2019)

4 Undergraduate Teacher Training and Preparedness for Environmental Education

From the aspect of developing students' environmental literacy and increasing their environmental awareness, teachers' competencies in the field and their development during undergraduate teacher training have a significant role to play. Teachers should be well prepared for environmental education, want to apply previous experiences and desire to search for opportunities to learn and develop in various life contexts (European Council,

2018). Based on the above, it can be assumed that students' satisfaction with various teaching methods can be predicted. The applied methods and strategies can motivate teachers to use them in their teaching practice.

Recent experience shows that in Slovakia, the content of undergraduate teacher training is insufficient for introducing the subject of environmental education. Moreover, teachers are not prepared to implement environmental topics and activities in the educational content of their subjects as a cross-cutting theme. To do so, certain environmental minimums should be developed in them during their undergraduate training. This minimum should contain indispensable thematic content, developing necessary skills and habits, examples of good practice, verified teaching methods, and recommended activities (Bilčík, Bilčíková, & Geršicová, 2021). Undergraduate teacher training programmes should focus on theoretical knowledge from profile subjects and professional didactic training, which can be considered a sum of pedagogical, psychological, and social sciences knowledge. Alongside appropriately selected methodical procedures for mediating professional knowledge, dealing with behaviour issues in the classroom, developing students' communication skills, building relationships with students, using appropriate methods of motivation, or creating a favourable classroom climate are essential parts of teachers' everyday work. In order to prepare students for sustainability and working with the above-mentioned international documents, effective methods of work should be applied during undergraduate training and opportunities for experiential learning should be provided.

5 Conclusion

Education is vital in achieving sustainable development and responsible behaviour—the twin transition of green and digital changes our ways of life, work, and communication. EU Member States' transition to a circular, digitalised, and climate-neutral economy will bring new jobs and effective use of artificial intelligence and robotics resources. Undoubtedly, schools must be prepared for such changes and react to them flexibly. Teachers' openness to innovations and new methods of teaching and their willingness to collaborate and share experiences can make their colleagues' jobs much more accessible and may lead to responsible actions in their students in a global context, independent critical thinking, and creativity, finding innovative solutions, and using new environment-friendly technologies for a healthier and safer environment. It can only be achieved by continuous lifelong learning and developing learners' competencies. Only then can schools prepare graduates to find applications in society and live happy lives.

Acknowledgement
The paper is an output of the KEGA grant project No. 001VŠDTI-4/2022 Teacher Training in Vocational Subjects following the Requirements of Twin Transition Green and Digital.

References

Act No. 17/1992 Coll. on Environment.

Bilčík, A., Bilčíková, J., & Geršicová, Z. (2021). Edukácia v súlade s Európskou zelenou dohodou k environmentálnej udržateľnosti. In J. Bílý et al., *Evropská unie – názory a vize.* České Budejovice: VŠERS.

Booth, T., & Ainscow, M. (2019). Index inklúzie. Nadácia pre deti Slovenska.

European Commission. (2020). *Európsky vzdelávací priestor.* https://ec.europa.eu/education

European Commission. (2019). The European Green Deal. Brussels. https://eur-lex.europa.eu

European Commission. (2019). *Education and Training. Quality education and training for all.* https://ec.europa.eu/education/events

European Commission. (2022). *Proposal for a Council Recommendation on Learning for Environmental Sustainability.* https://eur-lex.europa.eu

European Council. (2018). *Council Recommendation of 22 May 2018 on Key Competences for Lifelong Learning.* https://eur-lex.europa.eu/legal-content/EN

Institute for Environmental Policy (IEP). (2021). *Čo vás v tej škole učia. Analýza stavu formálneho environmentálneho vzdelávania na Slovensku*. https://www.minzp.sk/

Key competencies for lifelong learning. (n.d.). https://eperusteet.opintopolku.fi/

Krajňáková, E. (2020). Environmentálna výchova žiakov a mládeže vo Švédsku a Fínsku. *Didaktika, 2*, 21-25.

Ministry of Environment of the Slovak Republic. (2015). *Rezortná koncepcia environmentálnej výchovy, vzdelávania a osvety do roku 2025*. https://www.minzp.sk/files/dokumenty/

Szarková, M., & Horváth, M. (2016). Nástroje tvorby a udržania pracovných miest v SR. In J. Dušek et al., *Zaměstnanost a trh práce – česko-slovenské zkušenosti* (pp. 37-48). České Budějovice: Vysoká škola evropských a regionálních studií.

School Educational Gateway (2021). *Education for a Greener, More Sustainable Europe*. https://www.schooleducationgateway.eu

Zapletal, L. et al. (2018). *Vybrané kapitoly z profesní etiky. Etika v profesi manažera, podnikatelská etika, profesní učitelská etika*. Dubnica nad Váhom: VŠ DTI.

Zapletal, L. (2020). *Sociologie pro pedagogy*. Týn nad Vltavou: Nová Forma s.r.o.

Using an Interactive Whiteboard to Increase the Effectiveness of Teaching at Secondary Schools

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DOI: https://doi.org/10.53349/resource.2023.is1.a1189

Abstract

Modern electronic devices and teaching aids are constantly innovating education. Education has recently undergone many changes. Currently, the latest trend in the modernisation of teaching is represented by an interactive whiteboard. When used correctly, it represents a modern didactic tool that contributes to innovation and the efficiency of teaching a specific subject. This contribution aims to provide up-to-date information on using interactive whiteboards in secondary school teaching. In the paper, the authors describe the results of the conducted research. They focus on using the interactive whiteboard from the student's point of view and the teacher's. Using several research methods, the authors investigated the frequency of use of the interactive whiteboard and the learners' opinions towards its use. They also investigated the possibilities of streamlining the teaching process.

Keywords: Interactive whiteboard, Technical subject, Secondary school, Effectiveness of teaching

1 Introduction

Modernisation of the teaching process is essential when students and teachers are expected to have more technical skills. Education has recently undergone many changes, primarily new educational programs and the modernisation of the teaching process. This is also related to introducing newer and more advanced electronic devices into the teaching process to make it more efficient. Over the past decade, interactive whiteboards (IWBs) have become widely used teaching technology. One of the main reasons for the large-scale adoption of IWB in

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schools is that it can improve the teaching of the entire class by enhancing the visual impact and interactivity of the lesson (Gregorcic et al., 2018). Transforming secondary education is a long-term project. The use of IWBs can contribute to this goal under the right circumstances. A discussion of pedagogy should precede and include a discussion of technology use, methodology and effectiveness. A successful learning process is most effective when it helps individual teachers review their current pedagogy and see how IWB can support, extend, or transform it. Discussing the relative strengths and weaknesses of different ways of using technology for a particular purpose should be a part of the ongoing process of integrating and using new technology, in our case IWBs.

Technologies played a specific role during the COVID pandemic when they somehow consolidated their position in teaching theory and, more so, in educational practice. Among the technologies discussed were also IWBs. Many authors in their publications highlighted or criticised the role of the IWB during the COVID pandemic (Hargaš et al., 2022; Szőköl, 2022; Pondelíková, 2022, Bautista-Vallejo, et al., 2020, Wenham, 2022). Our experience showed that IWBs proved their validity and motivated teachers and learners to use them effectively in pedagogical practice, which was also reflected in face-to-face teaching.

2 IWB in the educational process

Different authors give the characteristics of IWB. IWB systems provide a multimodality environment wherein images, texts, and insertions from other software programmes (e.g., mathematical software) can be combined and manipulated directly on the screen by teachers and students (De Vita et al., 2018). Analysing the professional literature, we found dozens of definitions of IWB, which are similar in content. We put together the following definition through the penetration: An IWB is a digital whiteboard that gives you all the capabilities of your computer on a whiteboard. Plus, you can use your finger to write on the screen in digital ink. Then you can save, print, or distribute your notes at the touch of a button; you can access multimedia files, collaborate on activities by allowing two or more people to write on the screen simultaneously, and access the Internet and teleconference. Some authors (Dostál, 2009, 2011, Betcher & Lee, 2009) approach the IWB characteristic from a different perspective when they define it as a touch-sensitive surface through which mutual communication takes place between the user and the computer in order to ensure the maximum possible degree of visibility of the displayed content.

From a narrower point of view, IWB can be understood as an electronic device used in an educational environment as a material didactic tool intended for educational purposes. We can consider it as the basis of an interactive classroom, i.e., a system consisting of a computer, a data video projector and a blackboard while representing the first type of educational technology suitable for whole-class interaction.

In the broadest sense, an IWB consists of electronic devices and software for user interface, display, processing and editing. The basis is a computer to which a sizeable

interactive surface is connected – the blackboard itself, which allows the position of a pen or finger to be sensed and a data projector or other display device. The projector projects the image from the computer onto the board's surface, which also serves as a controller for the computer's cursor. The cursor is controlled by a special pen (stylus), a finger, or a marker with light-reflecting elements. The board is usually attached directly to the wall (like a classic school blackboard), or it can be placed on a mobile stand. A bare white wall can also be used when using an independent pen position sensor.

IWB has undergone technological development since its inception around 1990, when it was designed and manufactured for use in the office, primarily in small group meetings and roundtables. Although individual IWBs currently differ from one another depending on the manufacturer and the target environment, in principle, the IWB is a combination of individual components, as shown in Figure 1.

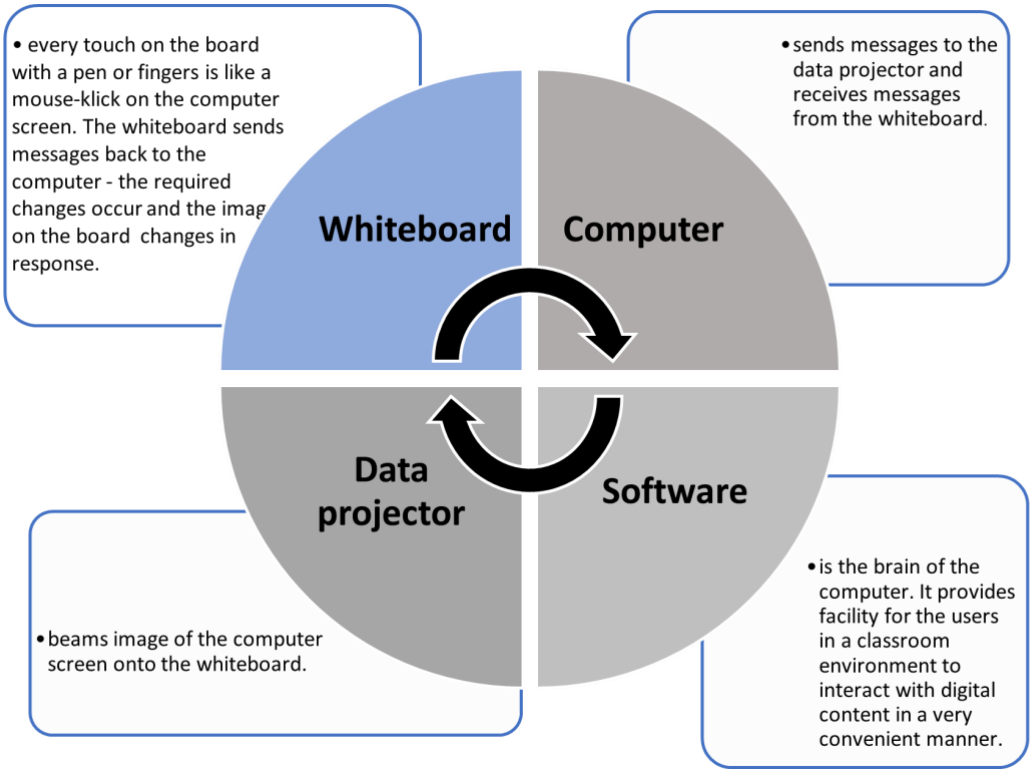

Fig. 1: Components of typical IWB, their interaction and functions (Source: authors)

2.1 Interactivity as the Main Feature

When working with IWB, interactivity and an interactive environment play an essential role. By interactivity, we generally mean a feature of teaching that enables mutual communication between the teacher and students, between students, between students and educational content, teaching aids and didactic techniques. In essence, it is about connecting all the components of the didactic process into one whole. As seen in Figure 2, you can imagine this communication as a combination of reading and writing, discussion, listening, individual or joint creation and reflection (Langer, 2016).

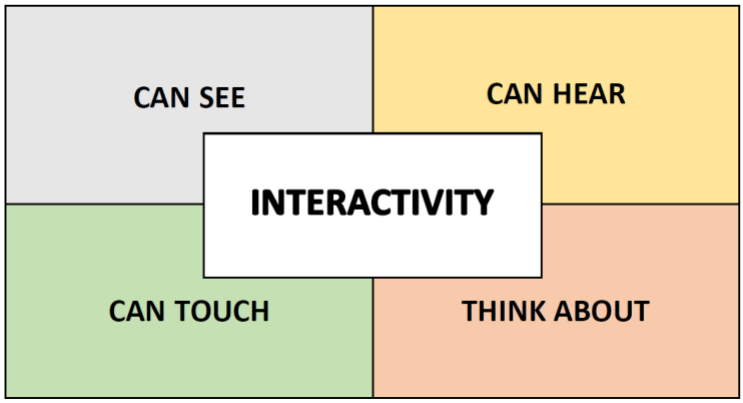

Fig. 2: Ideal interactivity (created by the authors according to Langer, 2016)

Our classroom observations showed that teachers conceptualised interactivity differently in their teaching practice. The interactive use of technology we observed can be categorised as follows:

- Technical interactions focused on interactions with the technical facilities of the board.
- Physical interactivity with a focus on “moving on” and manipulating elements on the board.
- Conceptual Interactivity – Emphasis on interacting, exploring, and building with curriculum concepts and ideas.

How IWB-related interactivity is understood and used in the classroom appears to underlie specific teacher practices and be shaped by teaching-learning theories more widespread in departments and schools. It also depends on:

- Subject and topic requirements;
- Student's perceptual abilities;
- Available time;
- Peripherals available.

Together, these elements help shape teachers' educational objectives, methodology and the way they use IWB. All these findings correlate closely with published knowledge and findings

of Moss et al. (2007). Many authors (Northcote et al., 2010; Wood & Ashfield 2008; Ahmad & Ali, 2019; Kühl & Wohninsland, 2022) deal with the interactivity in the teaching process stimulated by the multimodality of IWB and the subsequent creativity of learners as an output of activities mediated by working with IWB. Their works inspired our research, and we were pleased that the results of our research coincide in many findings with the already published findings of the authors we mentioned.

3 Materials and methods

3.1 Main aim and objectives of the research

The main goal of the research was to determine the impact of using IWB on teaching the professional subject of physics.
The partial objectives were:
O1: To find out if learners are more active when using IWB in class than those without using IWB.
O2: To find out whether the use of IWB has an impact on a better understanding of the new subject matter.
O3: To find out whether using IWB affects better memorisation of new material.
O4: To find out how teachers use IWB in teaching a professional subject.

3.2 Hypotheses of the research

The determination of the hypotheses resulted from the stated objectives of the research. As part of the research, the following hypotheses were established:
H1: Learners who use IWB in class are more active than those in traditional classes.
H2: Learners who use IWB in class understand the new subject matter better than those who do not use IWB.
H3: Learners who use IWB remember new material better in class than those who do not use IWB.
H4: Teachers who use IWB for teaching a professional subject consider their teaching more effective than teachers who do not use IWB.

3.3 Methodology of the Research

We adjusted the methodology to quantitative and qualitative methods considering the planned research activities. Based on the established research objectives and research hypotheses, we used the following research methods:

- method of analysis and synthesis of knowledge in the field of using IWBs in teaching,

- method of observation in physics lessons, using recording sheets and recording devices (camera, video camera),
- interview method with students and physics teachers,
- a questionnaire method to find out the opinions and attitudes of students towards the use of an IWB,
- mathematical-statistical methods for processing and evaluating research results.

We chose a set of several research methods with which we wanted to obtain the most accurate and objective information regarding the set goals and hypotheses of the research. Due to a better orientation, we considered the analysis and synthesis of knowledge necessary before starting the research. We drew information from printed sources (books and research articles) and electronic sources, where we searched for some already carried out research on the mentioned issue. We applied the observation method in the physics subject lessons in the first to third year of grammar school. For comparison, we completed peer observations in teaching physics with the use of IWB, as well as in traditional classes. We completed six peer observations, two lessons each in the first to third year. During the lessons, we watched the course of the lesson. We focused on the teacher's work in the lesson's motivational, expositional, fixation and diagnostic phases. We also monitored the students' work during class. We made short records of observations. For later analysis of the teaching, we created 5-7 photos and a 25-minute video recording from each lesson. We conducted the interview with the students in the school classroom between individual lessons. During it, the students provided us with additional information that we did not catch during the observation in class. We conducted interviews with the teachers before the start of the lesson. We were interested in the preparatory phase of the teachers, setting teaching goals and defining the curriculum.

We used the questionnaire to collect information from the students. The questionnaire was compiled in such a way that it was not too lengthy and, at the same time, had sufficient informative value. The students filled out the questionnaire within 10 minutes. It contained 19 items, of which 14 were closed items, two semi-closed items and three open items. Of the closed items, two were dichotomous (two choices), and the other were polytomous (multiple-choice). A set of closed items allowed students to choose an answer from the options offered. Semi-closed items allowed students to choose the offered answer or complete the answer. Students could add their answers to the open items. These answers offered us a wide range of information. In item no. 4, we investigated whether the more frequent use of IWB could increase teaching effectiveness. In items no. 6 and no. 7, we investigated whether IWB contributes to a better understanding and memorisation of new material. In items no. 8 and no. 9, we investigated students' satisfaction with the current use of IWB. In item no. 10, no. 11, we investigated how IWB affects cooperation between classmates, as well as between students and the teacher. In item no. 12, we were interested in how they use the IWB. In items no. 14, 15 and 16, we investigated how active students are when working with IWB. In item no. 17, we investigated students' motivation for working with IWB. In items no. 18 and 19, we were interested in the positives and negatives of using IWB, from the student's point of view.

We applied mathematical and statistical methods after collecting the necessary data for their evaluation.

3.4 Research Sample

We carried out the research at the Secondary Grammar School in Svidník, Komenského 16, Slovakia. This Grammar School is fully comprehensive. In the school year 2022/2023, it has six classes of the 4-year study, a total of 148 students. The educational process is ensured by 13 professionally and pedagogically qualified teachers (of which 10 are women) and three qualified external teaching staff (for teaching religious education).

The research sample consisted of two basic groups of respondents – students and physics teachers. The group of students consisted of a total of 110 respondents, of which 49 were boys (45%), and 61 were girls (55%). Of these, 39 first-year students, 38 second-year students and 33 third-year students (Table 1).

RESPONDENTS – LEARNERS	BOYS	GIRLS	TOTAL
1st year	17	22	39
2nd year	18	20	38
3rd year	15	18	33
TOTAL	**50**	**60**	**110**

Table 1: Respondents of the research – learners

4 Research Results

In this paper, we focused on interpreting partial research results in connection with objectives O1, O2, and O3 and the verification of hypotheses H1, H2, and H3.

Verification of hypothesis H1:
H1: Learners who use IWB in class are more active in class than those in the traditional class.
The established hypothesis was also based on questionnaire question no. 14:
Are you more active when using IWB in class than during traditional teaching?

The students answered the above question as follows: “Certainly yes” was answered by 18 students (17%), 40 students (36%) answered “Rather yes”, 26 students (23%) answered “Rather no”, 8 students (7%) answered “Definitely no”, and the option “I do not know” was chosen by 18 students (17%). A graphical representation of answers can be seen in Figure 3.

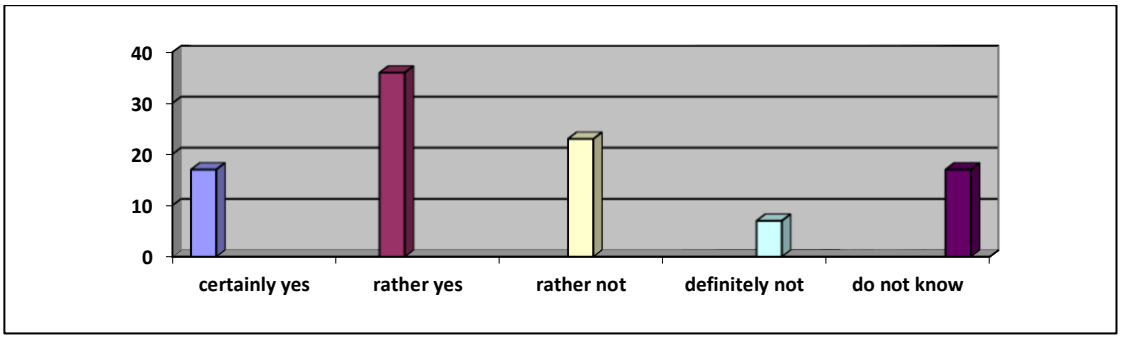

Fig. 3: Self-assessment of students' activity when using the IWB

The results of question no. 14 of the questionnaire show that 17% of students state in their self-evaluation that they are more active during lessons if IWB is used. In the interview, they later told us they could no longer imagine teaching only with a classic blackboard. As many as 36% of students answered “rather yes”. In the interview, they later told us that they are active primarily in the lesson with the IWB but also with the use of other electronic devices. 23% of students chose the “rather not” option. Seven per cent of students chose the option “definitely not”. Seventeen per cent of students could not comment on the question.

This result was also confirmed by the observation method in the class. During the lesson, we observed that a larger group of students was active throughout the lesson. Another smaller group of students developed an activity after the teacher's invitation or after assigning a specific task. Based on the questionnaire method, the method of observation and the interview, we found that the number of students who are more active in teaching the subject of physics with the use of IWB prevails. However, the difference is not opposed. Hypothesis H1 was confirmed in this case.

Verification of hypothesis H2:

H2: Learners who use IWB in class will understand the new subject matter better than those who do not use IWB.

The established hypothesis was based on questionnaire question no. 6:

Does IWB contribute to a better understanding of the new curriculum?

The students answered the question as follows: 36 students (33%) answered “definitely yes”, 49 students (45%) answered “rather yes”, 4 students (3%) “rather not”, 6 students (5%) “definitely not”, 15 students (14%) could not express themselves. The questionnaire results show that IWB contributes to a better understanding of the new subject matter among a larger group of students. There is a preponderance of students who better understand the new subject using IWB in class than when using a classic blackboard. During the interview, some students told us that it is primarily due to better visualisation of the new subject matter, better “engagement in the issue”, and the possibility of better cooperation between classmates and the teacher and between students. Hypothesis H2 was confirmed. It means

that IWB contributes to a better understanding of the new curriculum in the subject of physics, among students in the first to the third year of Secondary Grammar School.

Verification of hypothesis H3:

H3: Learners who use IWB in class will remember new material better than those who do not use IWB.

The established hypothesis was based on questionnaire question no. 7:

Does IWB contribute to a better memorisation of new subject matter?

The students answered this question as follows: 19 students (17%) answered “Definitely yes”, and most of the students questioned, up to 52, answered “Rather yes”, which represents (47%). Thirteen students (12%) answered “Rather not”, and 10 students (9%) answered “Definitely not”. Sixteen students (15%) could not comment on the question. In the interview, some students told us that they can remember the material better thanks to the interactive exercises they practice on the IWB. The teacher can use, for example, a quiz in the form of a question and answer, at the end of which he will receive immediate feedback from the students with a point evaluation. Some students said that such a quiz is too fast for them and that they need more time to memorize new issues. These results were also confirmed in the diagnostic phase of the lesson. Hypothesis no. 3 was confirmed, which means that IWB contributes to a better memorization of new subject matter.

The evaluation of both hypotheses H2 and H3 and the self-assessment of students' understanding and memorisation of the subject matter are shown in Figure 4.

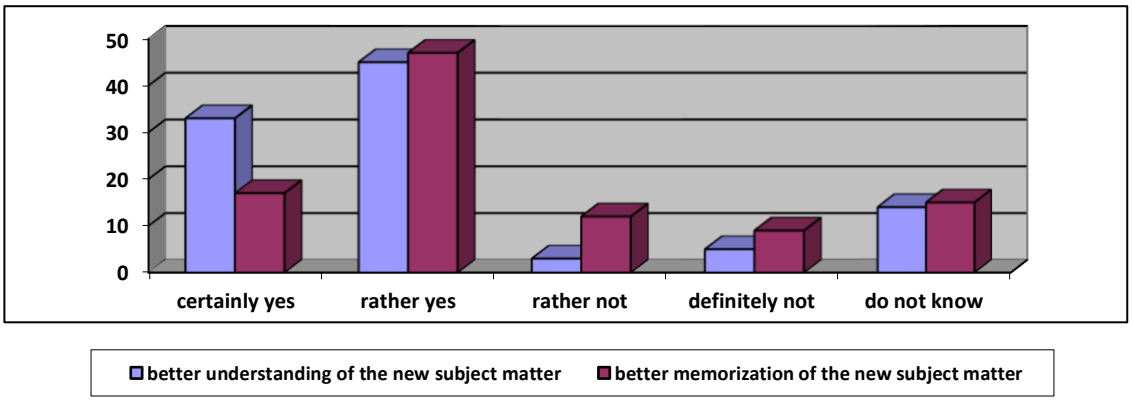

Fig. 3: Self-assessment of students' opinions and experience with the impact of IWB on better understanding and better memorization of new material

4.1 Summary and Recommendations

Based on our findings, we formulated the following recommendations for subject teachers who use IWB:

- when working with IWB, involve more individual students in the work than the whole group,
- allow students more time to work with IWB,
- reduce stress factors in students that arise during work with IWB,
- apply more interactive exercises in the lesson,
- to look for methods and forms of motivation for less active students when working with IWB.

Overall, the results showed that the students and teachers of the Secondary Grammar School in Svidník entertained a positive attitude towards using the IWB indicating that it was enjoyable and effective as an instructional tool and technological adjunct to classroom lessons.

5 Conclusion

Information and communication technologies and the IWB are fundamental and important landmarks in the innovation of the teaching process at all types of schools in Slovakia. Progress and developmentally unstoppable trends of digitisation have brought changes in the current era of education as well. The classic classroom and specialised classroom is transformed into a 21st-century classroom, in which the teaching process takes place with the help of new modern tools and teaching aids. In the continuity of the development of science, it pushes the boundaries of efficiency and the ability to acquire new knowledge, skills, and habits not only for students but also for teachers who organise and manage the teaching process.

As we mentioned in the introduction, the latest trend in the modernisation of teaching is represented by interactive technology presented by IWB. When used correctly, the IWB is a modern didactic tool that contributes to innovation and improving the teaching of professional subjects. Today we know that the trend of using IWB in secondary education is progressing. Schools are increasingly equipped with modern IWBs, which teachers and students must learn to work with. It is up to the teachers themselves how they will use the IWB in the lessons of their subject. Whether they will fully use its potential to make teaching more efficient or use IWBs only sporadically. Active student participation is also essential, as IWB is the first means of whole-class interaction. Without students' active participation, it is impossible to fully utilise the potential of IWB, which creates the assumption of less effective teaching of specialised subjects.

Acknowledgement:
This research and paper publishing was supported by the financial support of the Slovak National Grant Agency KEGA under Project 017UCM-4/2022.

References

Ahmad, W., & Ali, Z. (2019). Interactive Whiteboard (IWB) Effectiveness in vocabulary achievement and motivation: Saudi EFL learners' perceptions and insights. *Bull Adv Eng Stud*, *2* (2), 90-103.

Bautista-Vallejo, J. M., Hernández-Carrera, R. M., Moreno-Rodriguez, R., & Lopez-Bastias, J. L. (2020). *Improvement of memory and motivation in language learning in primary education through the interactive digital whiteboard (IDW): the future in a post-pandemic period. Sustainability, 12* (19), 8109. https://doi.org/10.3390/su12198109

Betcher, C., & Lee, M. (2009). *The interactive whiteboard revolution*: Teaching with IWBs. Aust Council for Ed Research.

De Vita, M., Verschaffel, L., & Elen, J. (2018). The power of interactive whiteboards for secondary mathematics teaching: *Two case studies*. *Journal of Educational Technology Systems*, *47* (1), 50-78.

Dostál, J. (2009). Interactive whiteboard in education. *Journal of Technology and Information Education*. ISSN 1803-537X, 2009, *1* (3), p. 11-16.

Dostál, J. (2011). Reflections on the Use of Interactive Whiteboards in Instruction in International Context. *The New Educational Review*, *25* (3), 205–220. ISSN 1732-6729.

Gregorcic, B., Etkina, E., & Planinsic, G. (2018). A new way of using the interactive whiteboard in a high school physics classroom: A case study. *Science Education*, *48* (2), 465-489. https://doi.org/

Hargaš, J., Matisková, D., & Miština, J. (2022). Distance Education Technologies and the Present Situation Influenced by the Pandemic. In Auer, M.E., Hortsch, H., Michler, O., Köhler, T. (eds) Mobility for Smart Cities and Regional Development – Challenges for Higher Education. ICL 2021. *Lecture Notes in Networks and Systems, 390*. Springer, Cham. https://doi.org/10.1007/978-3-030-93907-6_42

Kühl, T., & Wohninsland, P. (2022). Learning with the interactive whiteboard in the classroom: Its impact on vocabulary acquisition, motivation and the role of foreign language anxiety. *Educ Inf Technol* 27, 10387–10404, https://doi.org/10.1007/s10639-022-11004-9

LANGER, T. 2016. *Moderní lektor: Průvodce úspěšného vzdělavatele dospělých*. Praha: Grada Publishing, a. s., 2016. 224 s. ISBN 978-80-271-0093-4.

Moss, G., Jewitt, C., Levaaic, R., Armstrong, V., Cardini, A., & Castle, F. (2007). The interactive whiteboards, pedagogy and pupil performance evaluation: An evaluation of the schools whiteboard expansion (SWE) project: London challenge. Institute of Education, University of London. Research report, 816.

Northcote, M., Mildenhall, P., Marshall, L., & Swan, P. (2010). Interactive whiteboards: Interactive or just whiteboards? *Australasian Journal of Educational Technology*, *26* (4). https://doi.org/10.14742/ajet.1067

Pondelíková, I. (2022). Design thinking as a "Good practice" of x-learning. In EDULEARN22: *14th annual International Conference on Education and New Learning Technologies*, *Palma de Mallorca,* 4th – 6th of July, 2022, *14*. (eds. Luis Goméz Chova, Augustín López Martínez, Joanna Lees). Barcelona: IATED, 2022. p. 739-748, ISBN 978-84-09-42484-9. https://library.iated.org

Szőköl, I. (2022). The model of securing IT competencies. R&E-SOURCE, *Online Journal for Research and Education*, Special Issue. 74–79. https://doi.org/10.53349/resource.2022.iS24.a1111

Wenham, L. J. (2022). Anonymity as Freedom.: Drawing Critical Hope from Pandemic Pedagogy. In 2020 diVision: *A Year of Multiple Pandemics, Digital Dislocations, and Pedagogic Possibilities*. Myers Education Press.

Wood, R., & Ashfield, J. (2008). *The use of the interactive whiteboard for creative teaching and learning in literacy and mathematics: a case study*. Br. J. Educ. Technol., *39*, 84-96. https://doi.org/10.1111/j.1467-8535.2007.00699.x

Distance Education through Information and Communication Technologies

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DOI: https://doi.org/10.53349/resource.2023.is1.a1190

Abstract

The article deals with distance education through information and communication technologies, which has many advantages compared to traditional forms of education but also disadvantages. On the one hand, it allows to rationalise the work of teachers, helps to break down stereotyped activities, and makes it possible to interest and activate students. Still, on the other hand, not enough attention is paid to addressing psychological, sociological, and pedagogical problems. Flexibility and convenience can be included among the positives, i.e., learning for students at times that suit them best and in environments that stimulate them or where they feel comfortable.

Keywords: Information and communication technologies, Distance Education, Teacher and pupil

1 Introduction

A transfer from a traditional, face-to-face form of education to distance education with the use of online teaching has brought many new impulses that contribute to the development of digital literacy of both teachers and students. However, online education also has specific negative implications, particularly in the social and interpersonal areas. The purpose of using information and communication technology (ICT) in online education is to provide all students with an opportunity to learn how to use ICT and hence improve their learning. However, the pandemic period is now over. For students to use ICT for their learning activities, they must

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have such ICT at their disposal when they need it, and the ICT must correspond to the purpose of satisfying their individual learning needs. It means that more is needed to have access to ICT; it is also important how the use of ICT by students is supported to meet their individual needs to the maximum possible extent.

All students, including those with health impairments and special educational needs, should be supported by teachers and other professionals to improve and advance their ability to use ICT and become self-confident ICT users when learning. This requires students to develop their ICT skills gradually.

Furthermore, it also requires teachers to apply structured procedures when assessing ICT-related and use such methods to identify the practical needs of individual students as to the use of particular ICT tools. In this way, students can learn how to evaluate and manage their access to ICT and their preferences for assistive technology.

Based on a document published by the European Agency for Special Needs and Inclusive Education the utilisation of ICT as an efficient tool for individualised education is conditioned by the teachers' clear understanding of the ICT potential for supporting the strategies of "learning how to learn" (metacognition) and active approaches to teaching. Parents and legal representatives of students play a crucial role in supporting the processes of individualised education and developing strategies aimed at their active participation in their children's education. Supporting the use of ICT as a tool for parent-teacher interactions and communication is essential for school teams. (ICT in Inclusive Education, pp. 22–24)

2 School Teams and ICT

Students have increasing access to a much wider variety of digital learning materials at school and at home. As a result, three new tasks are imposed on school teams:

- To ensure students' safe use of ICT (also called electronic safety). Students with health impairments and special educational needs are potentially at risk of being abused online (e.g., online bullying). Moreover, it is also challenging for such vulnerable students to access assistance provided in the form of support, guidance, or sources for using ICT. To ensure the electronic safety of students, it is necessary to include the issues regarding the safe use of ICT in the extensive curricula of all students since their early childhood to achieve their emotional, social, and digital literacy.
- To harmonise all teaching materials with accessibility standards. The goal is to achieve that accessibility is perceived as a matter concerning all of us and that all authors and producers of teaching materials are adequately trained and equipped to produce accessible materials.
- To include digital education strategies for practical evaluation, planning and teaching. This includes using accessible ICT as a tool for simplifying and improving procedures for teaching and education based on cooperation, tutorship, joint problem solving and creating heterogenic groups within the educational activities.

(Pages 22–24 of ICT in Inclusive Education – a document published by the European Agency for Special Needs and Inclusive Education.)

3 Information and Communication Technology in Practice

Information and communication technology (ICT) has facilitated unbelievable progress in education since the end of the 20th century. It has brought new technologies and user possibilities for sharing information and communication among people, and these possibilities overcome the time barrier and spatial limitations. This 21st century is, therefore, justly referred to as the century of information technology and our society as the global information society.

Considering the new trends, people should be prepared for life in the new millennium — for the active and creative use of new ICTs that will not only improve the lives of individuals but also increase the prosperity of the whole society. The information society is associated with the creation of more jobs based on the provision of services and information and with the development of knowledge as a source of wealth and power. Economic growth and competitiveness of countries depend on the culture and literacy of their people; that is why education should be the primary focus of our attention. This applies not only to children's and young people's education but also to lifelong learning.

3.1 From the History of Information and Communication Technologies

The development of information and communication technologies began with the invention of the telephone by *Alexander Graham Bell* in 1875, which laid the foundations for creating a cable-based communication network. This telephone network initially covered the American region only, but it gradually started to develop and extended to the Transatlantic area. Eventually, it became a global communication tool covering almost the entire world.

In 1910–1920, wireless communication network technology started to emerge, manifested in the first AM radio broadcasting. This wireless voice communication was further developed into audio-visual communication, manifested in a television invented around 1940. The peak was reached in 1943 when the first electronic computer was created, a device increasingly used in ICT applications worldwide.

The ICT abbreviation has become a natural part of our language. Not very long ago, as stated by A. Halašková (2004, p. 128 – 129), we were only using IT, standing for Information Technology. But with inventing the latest communication technologies, i.e., the internet, mobile phones and communication satellites, the letter C was inserted between I and T. ICT stands for Information and Communication Technology, the tools used in a variety of ways to support studies, other educational activities as well as data processing and transfer.

Fig. 1 Development of information and communication technologies

As further stated by A. Halašková, ICT includes:

- Traditional media, such as television, video projectors and radio;
- Personal computers with multimedia support;
- Input and output devices, devices for digitalisation, scanning, control and measurements;
- Internet and internet services;
- Integrated educational programmes (complex computer learning environments);
- Technology for videoconferences;
- E-mail;
- Electronic and programmable toys; and
- Automatic detectors, recorders and devices for automatic data evaluation.

According to J. Kolejnička (1997, p. 21), ICT is a system of methods, programs, procedures, and activities that facilitate maximum utilisation of near and distant information sources employing a wide range of information media, or the creation of such sources, through communication in computer networks to find optimal solutions to given problems and tasks, or fulfil one's intentions, or satisfy one's own needs. Information technology (IT) represents one of 12 pillars of the National Scholarship Programme of the Slovak Republic, Millennium project, for the next 15 to 20 years. In the Millennium project, the IT pillar represents connecting all schools to the internet and training all teachers to use it. Also, one of the project goals was to ensure all students could work with the Internet when they finished their studies.

3.2 Preconditions for using ICT in education

According to V. Stoffova and L. Kis-Tóth (1998, p. 150), the critical preconditions for using ICT in education include:

- Learning how to work with Windows operational system;
- Processing texts and tables in Word and Excel programs;
- Learning how to work with the internet and electronic mail;
- Presentation of schools via the Internet;
- Learning how to work with scanners and printers;
- Using multimedia CDs in a teaching process;
- ICT applications in study subjects.

According to E. Petlák (1997, p. 8), modernisation of education does not mean only changing the teaching methods and forms or any other arrangements or equipment in schools but also changing the work style in general while emphasising encouraging creativity and independence of learners. Some of the possibilities for the creative use of ICT were also pointed out by I. Turek (2002), for example:

- Searching values, data and information;
- Making regular calculations;
- Revising the obtained knowledge, developing skills and habits;
- Presenting information and study topics; modelling and simulations;
- Control of the teaching and learning processes; learning by solving problems;
- Diagnostics of students;
- Teaching through programs;
- Teaching through assigning projects; and others.

Other ICT advantages include:

- High degree of motivation;
- Making hard-to-access situations accessible;
- Exclusion of dangerous situations;
- Simulation of time-consuming events in a relatively short period;
- Interactivity—students may directly interfere and change conditions;
- Promoting creativity.

Information and communication technologies also improve productivity and attractivity of the learning process; this brings the following positive consequences:
In situations like this, students ask more.

- ICT makes searching for information more accessible.
- Students have more courage to take risks since ICTs are more flexible and provide an option to return.

- They use more prosperous and more varied sources and more media.
- Students have higher motivation as they can find the latest information in the ICT environment.
- They may design, create and use data control, collection and measuring systems.
- Students communicate and cooperate more.

In today's knowledge society, access to adequate ICTs should be regarded as an issue related to human rights. ICT is regarded as an integral part of many aspects of life at various political levels — in the European Union, the World Summit on Information Society, and the UN. Above all, it is an essential tool for supporting broader social inclusion. When efficiently used, ICT facilitates inclusive education in individual schools and all educational institutions and promotes supporting them as academic communities. ICT has the potential to strengthen respect for diversity as a step towards education across all communities.

Access to ICT, which supports inclusion, requires fully accessible, available, and affordable technology and access to adequately adjusted and accessible learning materials that provide equal learning opportunities to all students. Digital exclusion is a complex problem affecting education experiences and broader social experiences of populations much more expansive than just people with mental impairments or special educational needs. Access to and support of accessible technologies, conventional and assistive, that reduce digital exclusion require a systematic approach to politics and practice with the participation of all relevant stakeholders.

4 Conclusion

On 15 March 2017, the Ministry of Education, Science, Research and Sport of the SR published the National Scholarship Programme of the Slovak Republic, "Learning Slovakia" which has laid the foundations for the execution of a substantial reform of the education system. The document was prepared by a team of experts based on regional and higher education needs. However, the transformation of the education system requires a transition of education philosophy from the directive one to the creative and human one; it must focus on individual personalities and the general development of students. However, the great reform of the education system is currently unfeasible. Experts recommend evaluating and completing it first and then addressing the required political support.

At present, the information and communication technology is part of our everyday life. It affects many aspects of society, including education, vocational preparation, and employment. Above all, it has become a precious tool facilitating distance education of students during the pandemic and of people with health impairments and special needs. This article deals with information and communication technology concerning improving quality of life and reducing social inclusion. It is internationally recognised.

References

Balačková, Ľ. (2004). Internet ako významný prostriedok sebavzdelávania. In *Zborník vedeckých prác z medzinárodnej vedeckej konferencie „Európska integrácia – výzva pre Slovensko*“. Nitra, SPU 2004, s. 26-30. ISBN 80-8096-356-0 (CD nosič).

Halašková, A. (2004). Nové média v kontexte technológie vzdelávania. In *Technológia vzdelávania*. Nitra, UKF 2004, 176 s. ISBN 80-8050-648-5.

Juszczyk, S. (2003). *Dištančné vzdelávanie.* Bratislava, Sapientia 2003, 169 s. ISBN 80968797-3-1.

Kolejnička, J. (1997). Sú informačné technológie evolúciou alebo revolúciou? In *Informatika v škole*, *16*, s. 20-23. ISBN 1335-616X.

Malá, E., & Malý, V. (2002). Prenikanie ICT do vzdelávacieho procesu. In *Zborník referátov z medzinárodnej konferencie „10 rokov technológie vzdelávania*“. Nitra, SlovDidac, 2002, s. 177-180. ISBN 80-967746-6-2.

Stoffová, V., & Kis-Tóth, L. (1998). Príprava budúcich učiteľov na zvládnutie nových didaktických a informačných technológií. In *Technológia vzdelávania*, Nitra, SlovDidac 1998, s. 150-161. ISBN 80-967746-1-1.

Petlák, E. (1997). *Všeobecná didaktika*. Bratislava, Iris 1997, 270 s. ISBN 80-88778-49-2.

Turek, I. (2002). *Zvyšovanie efektívnosti vyučovania*. Bratislava, Metodické centrum 2002, 326 s. ISBN 80-8052-136-0.

Krelová, K. (2007). Využitie informačných a komunikačných technológii vo vyučovacom procese. In Modernizace vysokoškolské výuky technických předmětu : *Sborník příspěvku z mezinárodní vědecké konference I*, Hradec Králové: Pedagogická fakulta Univerzity Hradec Králové, 2007. ISSN 1214-0554. ISBN 80-7041-335-4.

ICT v inkluzívnom vzdelávaní – materiál Európska agentúra pre rozvoj vzdelávania osôb so špeciálnymi vzdelávacími potrebami 2019 (s. 22-24).

Case Study of the Impact of Quality Management System CAF 2020 on the Employees in a Secondary Vocational School

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DOI: https://doi.org/10.53349/resource.2023.is1.a1191

Abstract

In Slovakia, secondary schools are starting to increase their quality with the help of various management techniques. The organisation's quality is also based on a well-established quality system and, of course, on the involvement of the teaching staff, employees, and students. Managing the quality of a school or school facility is a specific problem. When introducing the school management system, the school management decides and selects appropriate quality management systems. The article presents an analysis of the impact of the introduction of the new CAF model within secondary vocational education on school employees. The new CAF 2020 model is the fifth revised version of the model, while the changes to the current version of the CAF 2020 model mainly deal with digitization, agility, sustainability and diversity. A case study of this impact focuses on the conditions of one of the secondary vocational schools established in the Bratislava Self-Governing Region, namely the Secondary Vocational School of Transport.

Keywords: Quality of secondary vocational schools, Quality management systems, common Assessment Framework CAF 2020, European Institute of Public Administration EIPA, STN ISO

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1 Introduction

There is a wide range of ways to approach the efficiency of the functioning of organisations, and one of the possibilities is the introduction of quality management. In contrast, the quality assessment of secondary vocational education primarily focuses on the quality of theoretical teaching and practical training of students. However, the quality of a school is not measured exclusively by the quality of the educational process or professional training but also by how the school is managed, individual processes, organisational processes, promotion or care for students, parents, third parties and, finally, school employees. To be successful, organisations, regardless of size, structure, or maturity (level of management effectiveness and organisational excellence), need to create an appropriate management framework.

The Secondary Vocational School of Transport in Bratislava SOŠDBA (Stredná odborná škola dopravná, Bratislava) has been working for a long time to improve quality in all areas of its activity, both through the work of the school management and the work of the entire teaching and non-teaching staff. In 2020, the school management responded to the call of its founder – the Bratislava Self-Governing Region (BSR), to implement the Common Assessment Framework (CAF) at the school and thus increase its quality and make the school's operation more efficient. Based on the school's positive reaction to the above call, a contract was concluded between BSR and the company QM Slovakia Ltd., the subject of which was providing a quality management system according to the CAF model at the Secondary Vocational School of Transport in Bratislava.

Next, an analysis of the impact of the implementation of quality management according to the CAF model on SOŠDBA is presented based on the employees' opinions on the implemented measures (Prorok et al., 2021).

2 Background of the case study

2.1 Secondary Vocational School of Transport

The Secondary Vocational School of Transport in Bratislava (SOŠDBA), the subject of the processed subject study, is a modern educational institution for the transport and car repair segment, which provides professional education and training in study and teaching fields, and additional and post-secondary studies. It is a state school founded by the Bratislava Self-Governing Region (BSR). The main strategic goal of the school management is to maintain the school at such a high level that there is constant interest in studying at the school on the part of students, parents, and employers, and that it is attractive as an employer for quality teachers. About the strategic goal, the school constantly monitors development trends, challenges and changes in automobile production.

The school closely cooperates with various unions, status, and professional organizations in the form of active membership in unions, guilds, and organisations. In addition, it also cooperates with strategic employers within the private sector and finally, with universities and colleges. An essential part of the school's activities is international cooperation with foreign partners, which it develops within the framework of Erasmus + projects.

Part of the expansion of the school's activities is also making the study conditions more attractive, creating innovative study fields and overall development of the offered study options. Thanks to the introduction of new creative fields and the attractiveness of educational conditions, interest in studying at this school increased in 2018, and this interest continues to grow. Introducing new innovative fields is also related to the fact that school graduates either successfully apply themselves in practice or at universities.

2.2 Common Assessment Framework (CAF)

The CAF model (*Common Assessment Framework*) is already a well-known comprehensive quality management tool in Slovakia, created as a priority for the public sector (OECD, 2021; Maslov, Thijs & Dochot, 2018; Petrášová, Ryšánek & Votápek, 2004). As stated on the website of the Office for Standardization, Metrology and Quality Control of the Slovak Republic (Úrad SR, 2018), CAF is adapted specifically for the needs of public administration organizations. The current CAF 2020 model is already the fifth revised version of this model. It is a general, simple, accessible and easy-to-use model for any public sector organization (Asensio, Evaristo & Martins, 2021). It is based on the assumption that superior organizational performance results as well as results towards citizens/customers, employees and society are achieved through leadership strategy and planning. The CAF model, therefore, looks at the organization from different angles simultaneously. The individual criteria it deals with can be summarized:

- Leadership,
- Strategy and planning,
- Employees,
- Partnerships and resources,
- Processes,
- Citizen / customer-oriented results,
- Results in relation to employees,
- Results in relation to social responsibility,
- Key performance results.

The implementation of the CAF model at SOŠDBA began at the end of 2020 and took place in the following steps:

- creation and training of the CAF team,
- processing of the work plan by the CAF team,
- informing all school employees about the implementation of quality management within the school,

- processing of the Self-Assessment Report,
- processing of the Improvement Action Plan, which became the starting point for subsequent proposals for improving the quality of the school.

The Self-Assessment Report (Kalfa & Yetim, 2020) 2020 was prepared by the CAF team under the leadership of the supplier organisation QM Slovakia, Ltd. The report was focused on the description and characteristics of the organisation and within each of the criteria mentioned above of the CAF model, the strengths and weaknesses of the school were analysed. The analysis of the school's strengths and weaknesses, processed in the Self-Assessment Report, became the starting point for the search for possibilities for further improvement of the school's quality. These were subsequently specified in the Improvement Action Plan, which was also processed as the Self-Assessment Report by the CAF team under the leadership of the supplier organisation. Following the PDCA (*Plan-Do-Check-Act*) cycle, each school activity was evaluated in terms of its fulfilment status. SOŠDBA is striving for the title of the *Effective user of the CAF model*.

3 Collected Research Data and Findings

Research data were collected through an electronically administrated questionnaire. Respondents to the questionnaire survey were both pedagogical and non-pedagogical employees of the vocational school SOSDBA. It was administrated to all 45 employees of the school; however, its return was only 58%, i.e., only 26 employees from their total number of 45 responded to the call.

The questionnaire consisted of 13 items, of which one was an open question, in which the respondents could state openly their opinions. After this is presented an overview of the questionnaire items together with a discussion of the findings resulting from the data collected at them.The first items of the questionnaire were of factual character (age, gender, job position). The characteristics of the research sample of the employees who responded to the call to inquire in the questionnaire are presented in Fig. 1.

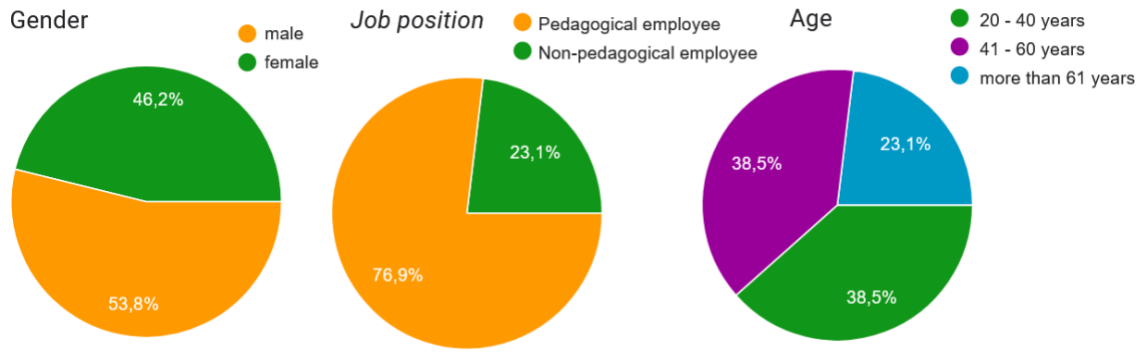

Fig. 1: Composition of the respondent's sample according to gender, job position and age.

The average age of the employees is 51.5. As the school has a relatively high number of employees over 60, employees under 40 who participated in the survey accounted for only 23% of the respondents. The survey was dominated by men at 53.8%, even though women comprise 55% of employees. According to expectations, pedagogical and non-pedagogical employees are equally at the level of statistically insignificant errors to participate in the questionnaire survey.

Due to the increased number of students after 2018, new employees have had to be hired in 2019 – 2022. This was why in one of the factual questionnaire items, the respondents were asked whether they had started their job in SOSDBA after July 1, 2022, since all employees were trained at CAF before this date. Concerning this aspect, 76.9% of the respondents started their job before the given date, while 23.1% after it.

Since the awareness of all employees and the correct understanding of the goals is a key factor for successfully implementing CAF, two of the questionnaire items were focused on this issue. The first of them was focused on the intensity of informing the school employees about CAF, and the other one on familiarising employees with its reasons and goals. As can be seen from the results presented in Fig. 2, the rate of informing was: 61.5% of employees were informed more than four times, 15.4% never and 84.6% were informed at least one time. The number 15.4% represents the respondents who entered their job at SOŠDBA when the CAF training had already been finished. What is essential is the fact that half of the respondents declared their familiarisation with CAF and reasons for its implementation at level 75 – 100 %. Because 23.1% of employees started working at SOŠDBA after implementing the CAF system, the level of awareness and understanding of the CAF goals can be evaluated as effective.

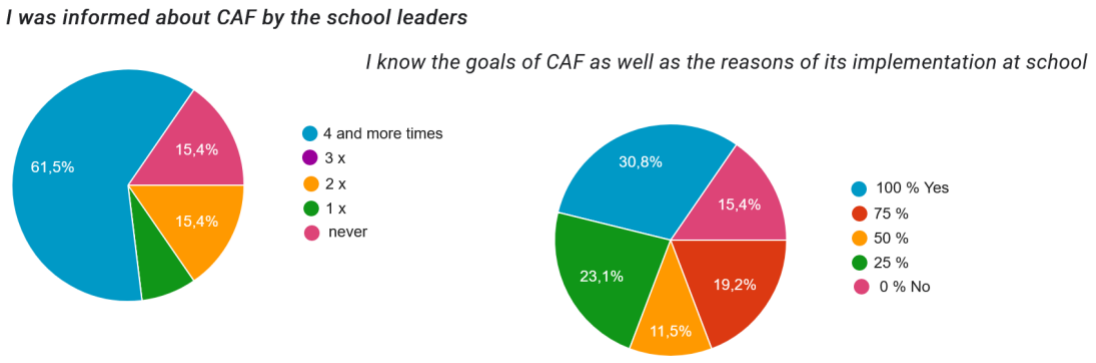

Fig. 2: Results regarding the employees` awareness of CAF.

The implementation of CAF at SOŠDBA affected primarily administrative and pedagogical employees. They were forced to adjust their work activities following CAF, at the same time, participate in the creation of new guidelines, report data from several years back, and prepare the Self-Assessment Report and the Improvement Action Plan. They performed these activities in addition to their regular work duties. We were interested in how satisfied they were with the changes that resulted from the CAF implementation and how they felt about

the work that had to be done concerning this implementation. An overview of the responses to these questionnaire items is presented in Fig. 3.

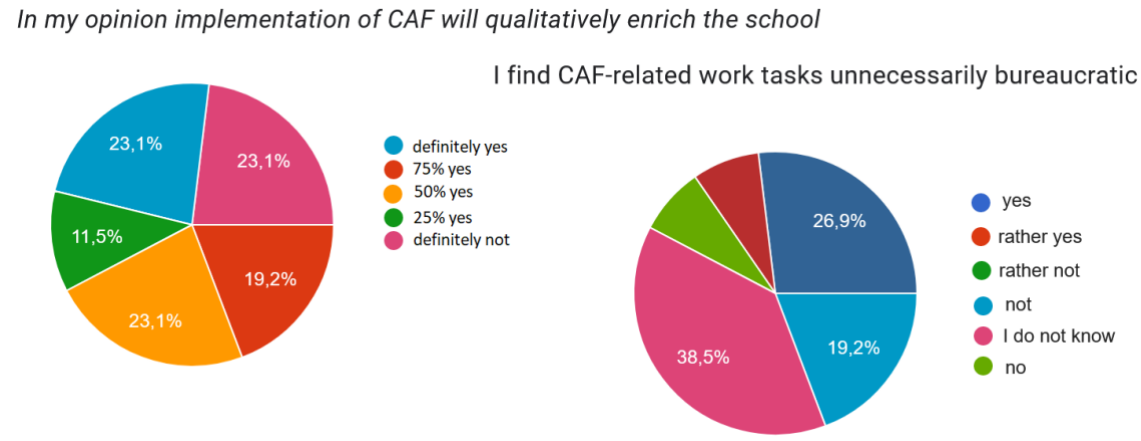

Fig. 3 Results regarding employees´ willingness to accept the CAF quality system and their opinions on CAF usefulness for the school

As the data presented in Fig. 3 shows, almost half of the respondents declared dissatisfaction with the modifications of their work activities following the principles of CAF. Only 4% of the respondents are satisfied with the introduced changes. Similarly, almost half of the respondents consider the CAF implementation a useless bureaucratic matter. Only four employees think otherwise. The others did not have a clear, strong view on this matter. Up to 57% of the employees participating in the inquiry perceived the work related to CAF as extra work, however, more than half would be willing to devote 1-2 hours a week to CAF. On the other hand, up to 30% of them do not want to devote themselves to it at all.

Finally, we ascertained the employees´ opinions whether, according to them, the implemented changes connected with the CAF implementation increased the quality of the school or not. More than half of the respondents could not answer this question clearly; six employees answered positively and five negatively. This is also reflected in the employees` willingness to perform activities connected with the implementation of CAF at the school (Fig. 4).

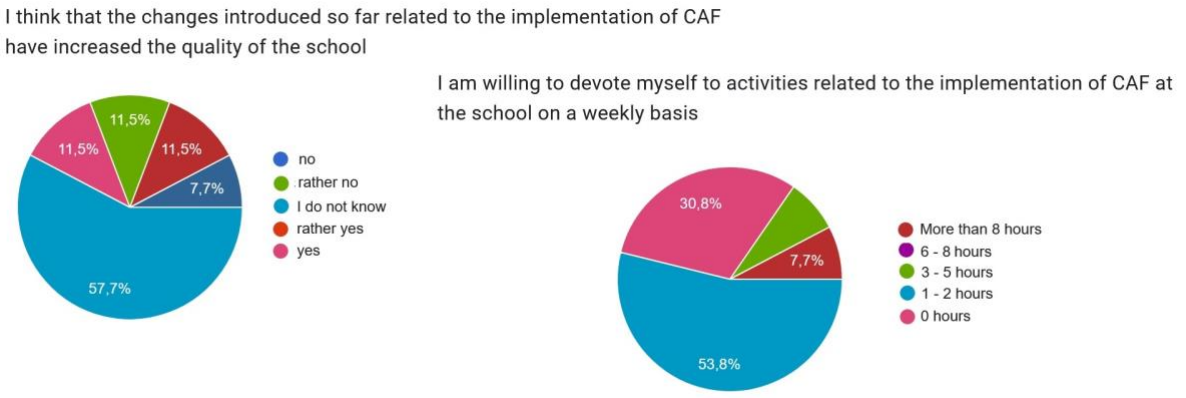

Fig. 4 Results regarding employees´ opinions on the impact of CAF implementation on the school quality and their approach to their involvement in the CAF implementation activities.

The possibility to state their opinions on CAF implementation or to comment on this issue, given to the respondents in the last questionnaire item (in the form of an open question), was used only by four employees. Two of them expressed themselves positively and looked forward to further work; two, on the contrary, negatively, and one suggested using SQM, which results in ISO standards.

4 Conclusions

Every school trying to improve its work probably considers which quality models to use. SOŠDBA decided between TQM and QMS (Hackman & Waterman, 1995). An advantage of using the QMS would probably be clearly defined, unalterable rules and standards in the form of directives and regulations. However, by its nature, QMS is more suitable for manufacturing companies, where it is possible to harmonise requirements with standards better and thus measure quality at all levels.

SOŠDBA finally decided on the CAF model. Mainly because the ISO standards are tough to apply to all activities within the school. The schoolworks with students, while its customers are not only students but also their parents, future employers of its students, and the entire society for which the school prepares its graduates. CAF appears to be a better alternative in line with respecting the uniqueness of the students and the staff. However, even this decision is good to consider.

If we talk about CAF as a suitable quality management model, it must be said that neither is the suitable ideal model for the school environment. The criteria deal with political involvement (schools in Slovakia are apolitical), the customer is difficult to grasp, and the same relates to customer satisfaction. Suppose the organisation aims to have satisfied customers, and we consider the students to be the school's customers. In that case, these will be satisfied if they do not have to study and have good grades. If we consider that parents are the school's customers, they rely on the school to do all the work, and the children do not have to learn at home. If the customer is considered an employer, this also sees the school's output from his specific point of view.

Another problem arises in matters of finances. Schools are primarily budgetary or contributory organisations that cannot influence financial resources to a sufficient extent.

The practice has shown that although one says the CAF is about a simple system, writing the Self-Evaluation report is quite demanding, mainly in terms of quantity (approx. 160 pages of text). This is also confirmed by the information on the website of The European Institute for Public Administration, where it is stated that the core of the CAF 2020 model is a questionnaire with 200 examples of self-evaluation of public organisations (4). The items in the individual criteria are, to a large extent, repeated. The school carries out some activities

that are the subject of questions within specific criteria. However, it does not have any evidence to prove that (e.g., promotion of the school – giving interviews on current social issues related to education, which subsequently do not even occur in the media).

From our point of view, CAF represents a long-distance race, the result of which should be a huge database of evidence of every single activity documented and allowing its checking. However, for such activities, the school would have to employ an entire staff of employees who would do nothing but process and evaluate tables and statistics. Nevertheless, the school is, first and foremost, an educational institution. Its priority is to provide a high-quality educational process and prepare students for the profession. Administrative employees, who usually work in negligible numbers at the school, mainly deal with personnel or financial matters. As the results of our questionnaire confirmed, teachers are not willing to spend time on activities that are not directly related to teaching. Organisations implementing the CAF model effectively can obtain the European title *Effective user of the CAF model*, valid for two years (Úrad SR, 2019). So once employees are relieved to have earned their CAF user title, they can start over again.

Based on the above-stated, we recommend designing a model specially created for the educational environment and not using the artificially modified model for public administration institutions. We are convinced that if such a model involved more students, teachers and other school employees, there would be a much greater effort to involve teachers in its implementation. They would see real possibilities for positive changes in the daily work and life of teachers, students, and administrative staff.

Acknowledgement

The authors would like to thank the Bratislava Self-Governing Region for the financial and moral help offered to implement the CAF 2020 Quality Management the concerned research activities realisation.

References

Asensio, M., Evaristo, C., & Martins, M. (2021). CAF challenges to promote public sector capacity. Lisboa, DGAEP. https://www.eipa.eu/wp-content/uploads

Hackman, R., & Wagerman R. (1995). Total quality management: empirical, conceptual, and practical issues. *Administrative Science Quarterly*, *40* (2), 309–42.

Kalfa, M., & Yetim, A. A. (2020). Organisational self-assessment based on a common assessment framework to improve organizational quality in public administration. *Total Quality Management & Business Excellence*, *31* (11-12), 1307-1324.

Maslov, D., Thijs, N., & Dochot, J. M. (2018). *Enhancing Social Responsibility in the public sector through the application of the Common Assessment Framework*. https://www.eipa.eu/wp-content

OECD (2021). *Ageing and Talent Management in European Public Administrations*. The OECD report for the Slovenian Presidency of the Council of the European Union. https://www.eipa.eu/wp-content/uploads

Petrášová, I., Ryšánek, P., & Votápek, V. (2004). CAF Společný hodnotící rámec (Model CAF). Praha, Národní informační středisko pro podporu jakosti.

Prorok, T., Parzer, P., Hochholdinger, N., & Ladstätter, M. (2021). *Impact of CAF on Human Resource Management and People*. https://www.eipa.eu/wp-content/uploads

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR (2019). *CAF 2020 Spoločný rámec hodnotenia: Európsky model zlepšovania organizácií verejnej správy prostredníctvom samohodnotenia*. https://www.caf-network.eu

Requirements on the Adaptation Process of Technical Subject Novice Teachers

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DOI: https://doi.org/10.53349/resource.2023.is1.a1192

Abstract

To achieve adequate quality vocational education and training at secondary vocational schools, it is necessary to ensure high-quality teaching staff. In the career system of the Slovak Republic, a beginning pedagogical and professional employee (novice teacher and novice training supervisor) is obliged to undergo an adaptation education, the purpose of which is to master all activities for the effective performance of the profession. Career requirements are of two kinds, personal requirements regarding the expertise in the given field and requirements regarding the general competencies to successfully perform the pedagogical employee profession. The paper presents the results of an inquiry aimed at the content and scope of adaptation education at secondary schools in the Bratislava region with a focus on novice teachers of technical subjects.

Keywords: Novice teachers, Adaptation process, mentors, Development of novice teachers´ competencies, Technical subject teaching

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1 Introduction

Beginning pedagogical and professional employees (novice teachers and novice training supervisors) in Slovakia are obliged to undergo an adaptation education to master all activities for the adequate performance of their profession. Career requirements to perform the job effectively are of two kinds: personal requirements regarding the expertise in the given field and conditions regarding the general competencies to successfully perform the pedagogical employee profession. One of the essential guidance practices for novice teachers starting their professional careers in teaching is mentoring. In Slovakia, novice teachers' professional induction is legislatively guaranteed by Act No. 317/2009 on teaching staff and professional employees. This Act officially introduces the role of mentor-teacher (so-called introducing teacher), and the position of novice teacher (§ 28, Act No 317/2009). In the Act, the function of a mentor is briefly defined, together with the manner of their appointment and definition of the job position of a mentor-teacher or professional employee as somebody who "performs specialised activities together with the performance of educational activities ..." and who is responsible for the implementation of novice teachers' induction and its continuous monitoring. The position of a mentor teacher can then be performed by an independent educator (teacher) or professional employee with the first attestation.

Compared to some other countries' school policies, no complex mentor training programme for mentor support has been developed in Slovakia. The first attestation and several years of teaching experience are adequate preparation for this position. However, in recent decades, the role of mentors in the education system has become increasingly important and at the same time, more and more attention is paid to the issue of their training (Duse et al., 2017; Gabrhelová & Pasternáková, 2016; Gadušová & Vítečková, 2013; Hrmo et al., 2015; (Le & Vásquez, 2011; Whitehead & Fitzgerald, 2006). Examples of various initiatives focused on professional mentor training provision can serve two international projects, the main co-ordinator of which is Constantine the Philosopher University in Nitra. One is the project *Mentor Training* (*Mentra*, Erasmus+2020-1-SK01-KA201-078250, https://www.mentra.ukf.sk/), and the second one is the project *Mentor´s Vademecum* (MeVa http://www.ktit.pf.ukf.sk). In connection with these two projects, there was carried out an inquiry aimed at the content and scope of the technical subject novice teacher's adaptation education among the technical subject novice teachers at upper secondary vocational schools in Bratislava region.

2 Mentors as the Key Factor of the Novice Teachers´ Adaptation process

The competence of teachers and ways in which to improve their practice has been the focus of a variety of initiatives across Europe (Gadušová, Harťanská, 2015). Much of this has concentrated on the production of explicit indicators for teacher quality (Strong, 2011; Sclafani, 2009; Zumwalt, Craig, 2005), in terms of competence, standards (Koster, Dengerink, 2008; Fisher, 2005; Houston et al., 2002;), learning goals and outcomes, and key qualifications (Common, 2005; Standards, 2005; Darling-Hammond, Youngs, 2004). The importance of career-long updating and development for practising teachers has been recognised (Danielson, 2007 Cochran-Smith, 2003), and practising teachers have become increasingly involved in training new entrants (Radulović et al., 2022) to the profession in many countries. To support this movement, the European Commission has developed the Common European Principles for Teacher Competencies and Qualifications (Common, 2005). Teachers Matter (OECD, 2005) recognises and stresses the need for more attention to the needs of those beginning their careers.

Already Trotter (1986) drew attention to the fact that a teacher needs many years of teaching experience before becoming skilful. The transition phase from a teacher trainee to a novice teacher involves different challenges, experiences, and roles. Novice teachers must improve their knowledge and skills acquired during their pre-service training and increase the effectiveness of their teaching techniques to achieve the status of expert teachers. In order to achieve this, novice teachers should be provided with the necessary assistance to help them manage the early phase of their teaching career (Solodkova, Ismagilova, Polyakova, 2017).

Many studies have been done to explore the issues and problems faced by novice teachers (Vítečková et al., 2016; Gadušová, Vítečková, 2014). Typical findings of them are that there is a lack of teaching and learning skills among novice teachers in classroom teaching and a need for novice teachers to be helped so they can improve their teaching skills. Additionally, classroom activities seem to be the most significant problem faced by novice teachers, as it causes them to fail to apply the knowledge, they receive during their classroom training (Saidin et al., 2020). Moreover, novice teachers who are not fully prepared to enter the teaching profession can also adversely affect the student's performance, which subsequently can cause a decline in their schools' grades. The further problems novice teachers face when they are first posted to schools are pointed out already Calderhead and Shorrock (1997). According to them, novice teachers have problems with their adaptation to the actual classroom environment, with proper guidance in managing students in classrooms, managing relationships with students in the classroom, with observing students` understanding of lessons, and with adapting to their roles in school`s social structure. To overcome all these obstacles, the novice teachers should be given proper guidance. However, there is no common focus on the specific needs of novice teachers or the concomitant needs of those who will

induct and support them in schools, i.e. mentors (Vítečková et al., 2016). In several EU countries mentors have become a valued and integral part of the pre-service training of teachers (Skaniakos, Penttinen, Lairio, 2014); in a few countries, they are also involved in the induction and support of new entrants to the profession. However, in most countries, there is no adequate preparation for teachers to become trained and qualified to act as mentor teachers. The teachers usually act as mentor teachers only based on their previous practice. This was a reason why in four of the Central European countries (Slovakia, Czech Republic, Hungary and Serbia) arose an initiative to prepare a program in the frame of which both in-service teachers, as well as mentor teachers, could be trained to perform adequately in the mentor teacher position (Hašková et al., 2022). Within the already mentioned international project, *Mentor Training* (a superstructure of which in a specific meaning is the other already mentioned Slovakian – Serbian bilateral project *Mentor´s Vademecum*), six higher education institutions from the four Central European countries have been designing teaching materials (), which should:

- support mentors` professionalism and equip them with relevant mentoring knowledge and skills, thus, making them more self-confident about their role;
- increase the level of mentors` (or the teacher trainers and introducing teachers`) mentoring competencies and understanding of their importance;
- contribute to creating professional but more trainee-friendly education/adaptation environments.

However, every medal has its reverse and obverse. To increase mentors` professionalism, it is not sufficient to know only the professional needs of the mentors. One must also know the participants' needs, i.e., teacher trainees but mainly of the novice teachers, and how the novice teachers evaluate the support they got from their mentors during their adaptation process. That is why there was carried out an inquiry aimed at the content and scope of the adaptation process of the novice teachers of technical subjects teaching at secondary vocational schools in Bratislava region.

3 Methodology of the Carried-Out Inquiry

One of the identified novice teachers` weaknesses, and in teacher training, very often the underrated area is the administration of pedagogical documentation (Vítečková et al., 2016). According to Vítečková (2018), only 10% of novice teachers do not declare the need for help or guidance. Approximately one-third (31%) declare only a rare need to obtain some help or guidance. In comparison, quite a considerable number 43% of novice teachers usually need help and advice, and even 16% of novice teachers need to be supported in this work very often. Based on the stated, we believe mentors of novice teachers should pay great attention to familiarising the novice teachers with this issue. We tried to find whether they do it and

how the novice teachers are satisfied with the support the mentors give them in this area during their adaptation process based on a questionnaire inquiry.

Within the questionnaire inquiry, the novice teachers (i.e., teachers with teaching practice of up to 5 years) stated from their point of view how they were satisfied with the way and scope in which their mentors had familiarised them with the administration of 22 basic kinds of pedagogical documentation (stated in Table 1). The respondents express the satisfaction scale rate using the "*definitely not satisfied – rather not satisfied – neutral – rather satisfied – definitely satisfied"*. To be satisfied means using the scale that the mentor appropriately acquainted the mentee with the given topic to perform the relevant activities independently. Subsequently, at processing the collected research data, the used scale was transformed into the point values of 1-5. This assessment was the critical item of the questionnaire inquiry. Besides this item, there was an open question in which the respondents could state further activities they consider essential for teacher job performance. Mentors should familiarise novice teachers with them during their adaptation process. Another "open" question was the item in which the respondents were asked to state how long lasted their adaptation education ("open" it was as there were offered no answers. However, the possible answers were limited because, according to the legislation, it should be completed within one year of the novice teachers` practice).

The questionnaire was administered electronically to 52 secondary schools in the Bratislava self-governing region, from which 15 were vocational-technical schools, 16 were grammar schools, and 21 were other (non-technical) schools. From the addressed schools, 63 teachers of technical subjects with teaching practice of up to 5 years responded to the call to participate in the administrated questionnaire inquiry. Return of the questionnaires per addressed schools depended on two factors: the scope of the technical subjects taught at the concerned school. The other one was the number of novice teachers of these subjects acting at the school (the term novice teachers describe the beginning teachers with teaching practice not longer than five years).

4 Results and Discussion

Results of the assessment of the novice teachers´ satisfaction with how their mentors had familiarised them with the administration of 22 different kinds of pedagogical documentation are summarised in Table 1.

The percentage score in the table expresses the percentage rate of the achieved number of points from the total sum of 315 points, which each kind of the given pedagogical documentation could achieve. As the total number of respondents was 63, and each could assess each kind of the stated pedagogical documentation with a maximum of 5 points, each of the given items could achieve 5 x 63 = 315 points.

Assessed item	Percentage score
Getting familiarised with pedagogical documents - class book, class report, managing filling in the forms	86.98
Getting familiarised with the School's Educational Program, curriculum, content and performance standards, cross-cutting topics, and thematic educational plans	86.98
Getting introduced to methodical instructions, and assessment and classification of students	85.71
Getting familiarised with the School's Regulations, Organisational Rules, Work Rules, Operational Rules	85.40
Getting familiarised with the rules for filling in the electronic class book (ECB) - recording grades, attendance and lessons	83.81
Getting familiarised with thematic educational plans creation	82.86
Getting familiarised with school forms and their recording	81.90
Getting familiarised with the pedagogical and organisational instructions of the given school year	81.90
Instructions for preparing various school events and extracurricular activities, e.g. insurance of different competitions or subject Olympiads	81.59
Instructions on how to solve the problems with student's school attendance. and consult it with the parents	81.27
Instructions for completion of the class book, class report and personal records	80.95
Instructions for dealing with students' poor school attendance. through consultation with an educational advisor	80.63
Instructions for writing activities during lesson hours	80.32
Getting familiarised with working with the school information system	80.00
Getting familiarised with the procedures applicable in the event of an accident, or insurance claim, when releasing students from lessons	79.37
Getting familiarised with the school director's advisory bodies	78.41
Instructions for the fulfilment of the thematic educational plans, to the preparation of documentation, e.g., related to schools in nature, excursions, and trips, following the valid internal directives	77.14
Dealing with analysis and solution of the main tasks related to the work of the subject committees, dealing with the responsibilities resulting from their sessions	76.19
Instructions for finalisation of documents for (quarterly, half-yearly, three-quarterly, and end-of-year) classification	76.19
Getting familiarised with the school library and the literature available in it	73.97
Getting familiarised with checklists, class inventory control reports, and work of the inventory committee	71.11
Getting familiarised with the printing of (midterm, and end-of-year) certificates	59.68

Table 1: Ranking of the areas of the pedagogical documentation according to the novice teachers´ satisfaction with how their mentors had familiarised them with the issue of their administration.

At first glance, the obtained results (ranking of the areas of the pedagogical documentation in dependence on the level of familiarisation of the novice teachers with them presented in Table 1) confirm the logically expected fact that the immediate attention both in pre-gradual training of teachers, as well as in adaptation education of novice teachers is paid to the critical kinds of pedagogical documentation. These are the items ranked at the first eight places, pedagogical documentation connected with common everyday teaching activities of teachers (items with achieved values of percentage scores more or less 82 and more percentage). The second group of pedagogical documentation in the obtained ranking also consists of crucial pedagogical documentation. However, in contrast with the first group of pedagogical documentation. However, these pedagogical documentations are an integral part of everyday teaching activities; they are not included in their everyday teaching activities. As such, the following six items of the obtained ranking ranked ninth to fourteenth with the obtained percentage score from the interval 80 – 81.6. The third group of pedagogical documentation consists of the kinds of documentation with a percentage score of less than 80%. This is the documentation with which the teachers come into contact either in exceptional cases of their activities or only after some long-time of their pedagogical practice; what is the reason why the mentors do not pay attention to get the novice teachers familiarised with them at the very beginning of their practice.

Although one can say that the inquiry did not bring any new knowledge, as the results (results presented in Table 1 and the above-presented comments) could be logically expected, a deeper analysis of the collected data brought one interesting significant finding.

As the duration of the adaptation education led by the mentor differs, the respondents were asked to state how long it lasted in their case (according to the legislation, it should be completed within one year of the novice teachers` practice, who decides about it is the head of the school, not the mentor). The results showed that in the case of 43% of the questionnaire respondents, their adaptation education was less than three months (54% stated its duration was 3 – 12 months, and 3% even more than one year). The deeper analysis showed that just those respondents, the duration of the adaptation practice were less than three months, stated dissatisfaction with their familiarisation with the kinds of the first group of the pedagogical documentation. The figures presented in Table 1 can be understood in such a way that the items ranked in the first eight places represent essential pedagogical documentation, with which all novice teachers should be wholly familiarised, and the figures show us still a 10 – 20% reserve of the novice teachers´ concerned knowledge. Based on the analysis, this "reserve" is due to novice teachers' weaknesses (drawbacks) with the short duration of their adaptation education. These were those who stated a low satisfaction with how their mentors had familiarised them with the issue of their administration. The main conclusion resulting from this finding is that three-month adaptation education is not enough. It should be carried out in its maximal length of 12 (or ten concerning the duration of the school year) months. This will allow the mentors:

- wholly to familiarise the novice teachers with all basic kinds of pedagogical documentation,

- to familiarise the novice teachers also with the pedagogical documentation related to particular activities of teachers (not every day performed activities).

Another “open” question was the item in which the respondents were asked to state how long lasted their adaptation education (“open” it was as there were offered no answers. However, the possible answers were limited because, according to the legislation, it should be completed within one year of the novice teachers` practice).

The possibility to state in the questionnaire open question topics, which they consider to be essential for teacher job performance, and mentors should make the novice teachers familiarised with them during the novice teachers` adaptation process was used only by 19 respondents. The list of the topics stated in the case of 14 of them is as follows:

- familiarisation with general rules and obligations,
- dates of the teacher's work schedule,
- explanation of Edupage and familiarisation with the school premises,
- explanation of Edupage more thoroughly,
- information about the group of students, about the organisation of time, etc.,
- communication and assessment of integrated students,
- how to work with integrated students,
- level of students' intelligence,
- issue of students´ intelligence,
- instructions on how to solve conflicts with students and parents,
- communication with parents, solving a conflict situation,
- feedback on own teaching,
- familiarisation with the structure and history of the school,
- ethics code.

The other five respondents did not know what else they would appreciate discussing with their mentor (some responses or not claiming any response were also influenced by the fact that the respondent had not completed his/her adaptation education):

- I was not familiarised with anything yet,
- everything mentioned above is probably the most essential, especially if it is necessary to focus on such practical matters as using what is available in the school, to whom the same applies, where certain aids can be found,
- All that are listed,
- I cannot think of any others,
- I cannot think of anything yet.

5 Conclusion

Although the position of the mentors in the education system in many European countries is also introduced in their legislation, there is no consensus on the professional mentor profile, qualification, and duration of novice teacher adaptation education. Mentors are dependent on themselves when carrying out the mentoring activity. The finding resulted of the presented inquiry can be understood as a contribution to solving the stated issues.

The main finding regards the duration of novice teachers` adaptation education. On the one hand, the lengths of the adaptation process should allow sufficient time for the novice teacher to transfer from the position of a teacher trainee to the position of a qualified, competent teacher. On the other hand, it should offer sufficient time to the novice teacher´s mentor to familiarise his/her effort with the school environment and all duties and responsibilities accompanying the teaching career.

6 Acknowledgements

The authors would like to express their thanks for the financial, organisational, and moral help and support offered them by the Bratislava Self-Governing Region (BSR) regarding the questionnaire inquiry realisation, as well as to the Department of Education, Youth and Sports of the BSR for the assistance and co-operation at the administration of the relevant questionnaires. The project of the Slovak Research and Development Agency APVV SK-SRB-21-0025 and Erasmus+ project No. 2020-1-SK01-KA201-078250 supported publication of the paper.

References

Calderhead, J., & Shorrock, S. (1997). *Understanding teacher education*. London, The Falmer Press.

Cochran-Smith, M. (2003). Learning and unlearning: the education of teacher educators. *Teaching and Teacher Education*, *19*, pp. 5–28.

Common (2005). *Common European Principles for Teacher Competences and Qualifications European Commission*. Brussels, Directorate–General for Education and Culture. Brussels. http://europa.eu.int/comm/education/policies

Danielson, Ch. (2007). *Enhancing professional practice: A framework for teaching*. Association for Supervision and Curriculum Development, 2nd ed.

Darling-Hammond, L., & Youngs, P. (2004). 'Defining 'highly qualified teachers', what does scientifically-based research actually tell us?', *Educational Researcher*, *31* (9).

Fisher, R. L. (2005). *Standards for Teacher Educators: Preparing High-Quality Teachers*. Available at: http://www.education.pearsonassessments.com

Gadušová, Z., & Harťanská, J. (2015). Mentor training pilot: Case studies. *ERIE 2015 : Efficiency and Responsibility in Education. Proceedings of the 12th International Conference*, p. 135-144. Praha, Czech University of Life Sciences.

Gadušová, Z., & Vítečková, M. (2014). International research in the field of novice teachers' induction. *Internationalization in Teacher Education*, *6*: Challenges, pp. 87-106. Baltmannsweiler, Schneider Verlag Hohengehren GmbH.

Gadušová, Z., & Vítečková, M. (2013). Mentors' and novices' perception of teachers' professional career start in Slovakia and in the Czech Republic *Procedia – Social and Behavioral Sciences, 106*, 1825-1833, https://doi.org/10.1016/j.sbspro.2013.12.207

Hašková, A., Radulović, B., Mikla, Š., & Stajić, S. (2022). Aktivity na podporu odborného rastu mentorov [Activities supporting professional development of mentors]. *Technika a vzdelávanie* [*Technology and education*], *11* (1), 12-17.

Houston, W. R., Dengerink, J. J., Fisher, R., Koster, B., & McIntyre, D. J. (2002). National standards for teacher educators: the story of two nations. In Guyton, E. M., Rainer, J. D. (Eds.) *Research and using standards in teacher preparation, Teacher Education Yearbook X*, pp. 25-51. Washington DC, Association of Teacher Educators.

OECD (2005). *Teachers matter: Attracting, developing and retaining effective teachers*. www.oecd.org/dataoecd/39/47/34990905.pdf

Radulović, B., Jovanović, T., Gadušová, Z., Hašková, A., &, Pavera, L. (2022). Mentor´s perception of the future teacher´s teaching practice. *Journal of Education Culture and Society*, *13* (1), pp. 145 – 155.

Saidin, K., Shafii, S., & Veloo, A. (2020). *Novice teachers' strategies to overcome the challenges in teaching and learning. Elementary Education*, *19* (2), pp. 69-78. 10.17051/ilkonline.2020.02.108.

Sclafani, S. (2009). *Organisation for Economic Co-operation and Development, Evaluating and rewarding the quality of teachers: International practices.* Paris: OECD.

Skaniakos, T., Penttinen, L., & Lairio, M. (2014). Peer Group Mentoring Programmes in Finnish Higher Education – Mentors´ Perspectives. *Mentoring and Tutoring. Partnership in Learning*, *22* (1), pp. 74-86.

Solodkova, I. M., Ismagilova, L. R., & Polyakova, O. V. (2017). Role of mentoring in novice teachers adaptation. Valeeva, R. (Ed.): *Teacher Education – IFTE 2017: Proceedings of the 3rd International Forum on Teacher Education*, European Proceedings of Social and Behavioural Sciences, *29*, pp. 790-798. Future Academy. https://doi.org/10.15405/epsbs.2017.08.02.90

Standards (2005). Standards for the Award of Qualified Teacher Status, *Handbook of Guidance. Accompanies Qualified to Teach, the Professional Standards for Qualified Teacher Status and Requirements for Initial Teacher Training*.

Strong, M. (2011). *The highly qualified teacher: What is teacher quality, and how do we measure it?* New York, Teachers College Press.

Trotter, R. (1986). The mystery of mastery. *Psychology Today*, *20* (7), pp. 32–38.

Vítečková, M. (2018). *Začínající učitel: jeho potřeby a uvádění do praxe* [*Beginning techer: his needs and introduction into practice*]. Brno, Paido.

Vítečková, M., Procházka, M., Gadušová, Z. & Stranovská, E. (2016). Identifying novice teachers´s needs – the basic for novices´ targeted support. *ICERI 2016: Proceedings 9th International Conference of Education, Research and Innovation*, pp. 7731-7738. Seville, IATED Academy.

Zumwalt, K., & Craig, E. (2005). Teachers' characteristics: Research on the indicators of quality. AERA Panel on Research and Teacher Education. In Cochran-Smith, M. & Zeichner, K. M. (Eds.) *Studying teacher education: The report of the AERA panel on research and teacher education*, P. 157-260. Mahwah, N.J.

Development of Key Competences of Students Preparing in the Field of Study to Reception Technicians

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DOI: https://doi.org/10.53349/resource.2023.is1.a1193

Abstract

The presented article deals with the development of key competencies of students preparing in the study field of reception technician. It describes key competences, the possibilities of developing key competencies and the development of key competences of primary and secondary school students. The article draws attention to the development of key competencies through a professional didactic text focused on the management of the work of a reception technician in a car service and selected options for evaluating professional texts. Expert evaluation methods, according to Turek (2010), were chosen for the evaluation of the professional text. In this part, we focused on the evaluation of features such as content correctness, compliance with the curriculum, clarity of expression and transparency, connection of theory with practice, simplicity, appropriateness and interest, the content side of the curriculum, arrangement of the curriculum into a system, inter-subject relationships, and clarity.

The results showed that all experts evaluated the features of the professional text on the rating scale 0, +1 and +2. They did not use the ratings -1 and -2. The experts were in the Czech Republic and Slovakia.

Keywords: Key Competencies, Reception Technician, Professional Didactic Text

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1 Introduction

Acquiring, developing, and mastering the key competences of pupils preparing for the job of reception technician is closely linked to improving teaching and increasing its quality. In the current era and the company's conditions, we must constantly adapt to new changes and requirements. Therefore, to not lose a certain continuity with education development, we must look for new ways to find more attractive, more effective teaching of students for personal and professional application.

In its 1997 report to UNESCO, the International Commission on Education in the 21st Century, led by Jacques Delors, identified four main principles of education for Europe: "Learning to learn, learning to work, learning to live together, learning to be". However, they emphasised that traditionally applying these principles in teaching is no longer acceptable.

The education process should focus on competencies and their development in children and pupils. To develop key competencies, which can be achieved through specific contents, subjects and areas of education.

Therefore, educational outcomes and requirements cannot be tied to the specifics of certain teaching subjects but are also tied to universal knowledge, abilities, and skills that we usually apply in our lives, work areas and life situations.

2 Analysis of Key Competencies

In connection with employment issues, Mertenz began to analyse and solve key competences from the 1970s. D. (1974). Subsequently, the strategic goal of developing key competences in a knowledge-based society was determined by the Lisbon Process (2000). In 2001, the working group started working on creating basic concepts in educational processes to improve the quality and efficiency of education systems. The most important task was the creation of a definition of the concept of competence and, accordingly, its characteristics. In the late 1990s, it began to be used in education as a bridge between the graduate profile and the requirements from employers. To use one of the styles, copy the templates to the directory where you want to save your manuscript. Double-click the template to create a new document. Save the document under a new name.

The concept of competence began to be used in pedagogy in connection with the analysis and change of the content of school education in European school systems. The change in didactic terminology is in line with European developments, where education tries to express social habits for the entire population, at a new level and in the quality of education. Therefore, the importance of the quality of education for the entire population continues to grow (at the primary and secondary levels, this knowledge base is based on the development of key competences).

Education is a process in which, through teaching, an individual acquires a system of knowledge and activities, which he transforms into knowledge, experience, and habits through internal processing – learning. The education process takes place between two agents: the educator (teacher, lecturer) and the educated (pupil, student). From the educator's point of view, it is about teaching; from the point of view of the educated, it is about learning.

Formation of the so-called terminology key competence started in an Anglophobic environment. It went through a specific development from the concept of "competence as the basic skill" when it was also referred to as "competences" up to the final terminology of "key competences". The term "basic skill" only defined habits that related to reading (literacy and numeracy), or "life" or "survival skills". Thanks to its narrow scope, the term "competence" was also used, which, even in a Francophobic environment, became famous as "competence" (Veteška, Tureckiová, 2008).

In addition to the concept of key competences, individual states also use the following distinctions in their curriculum:

- Threshold and final competencies (e.g., Walloon community in Belgium),
- Basic competences (Spain, Luxembourg, Portugal),
- Key competencies (Great Britain).

By competence, we understand the ability that activates and applies an internalised system of knowledge, abilities, professional, personal, and social skills, values, attitudes, as well as other personal qualities, which has a specific arrangement (rate, intensity, ratio of individual components, method of grouping, hierarchy). Various activities can activate this system in real life.

Competence can also be understood as behaviour that maximises and improves performance in certain areas of activity. Within a set of competencies, core competencies are the most important. With their help, a whole range of unforeseen problems can be solved, and thanks to them, an individual can successfully cope with various changes at work and in their personal and social life (Hrmo, Turek, 2003 in Kučerka 2011).

2.1 Key Competences and their Characteristics

According to Kučerka (2011) in the Report for UNESCO in 1997, the International Commission for Education in the XXI. century, led by Jacques Delorson, determined four basic principles for Europe: "Learning to learn, learning to work, learning to live together, learning to be". However, he realised that it could not be learntraditionallyway. When learning, one should focus on developing the student's competence, especially developing key competencies, which are the most important. This is possible through appropriate content within different subjects or areas of education. Competences are learned, developed and applied through activities.

Competences and skills will make it possible to create value orientations, which are procedural quantities and "above all lived".

The hierarchical model of the competence structure is based on mental and intellectual abilities and is supported by attitudes, interests and needs that create motivation. The skills, knowledge and experience created on these foundations shape the individual's behaviour. The resulting behaviour, i.e., negotiation competence, then serves to adapt to new situations and to solve problems.

From this point of view, Mertens (Mertens, 1974 in Dzíbela, 2019) identified a set of knowledge, abilities and skills which, although not tied to a particular activity, are used as critical qualifications within certain professions. He divided these key qualifications into four categories:

- Skills usable in different situations and contexts (basic qualifications)
- Skills for effective work with information (horizontal qualifications)
- Skills for work performance (expanding qualifications)
- Skills related to an individual's social behaviour and adaptation (time factors).

Key qualifications are used in professional education, mainly concerning retraining and further professional education. The sets of key competencies thus make it possible to define more general qualifications that are the content of key competencies. This approach subsequently influenced forming and developing key competences and defining curricular contents in European documents.

However, if we were to discuss competencies from the point of view of analysing individual characteristics, then Lombardo offers frozen items (Lombardo in Veteška, 2009) – "Quick learning of new knowledge":

- Creativity and ingenuity
- Determination
- Flexibility and balance
- Self-awareness
- Handling complex tasks
- Troubleshooting
- Team orientation
- Management of colleagues
- Recruiting new talented workers
- Creating and improving interpersonal relationships
- Compassion, tact, sensitivity
- Balance between private life and work.

The basic competence model proposed by Greenspan and Greensfield (Beneš, 2004) is:

- Instrumental competence – includes the intellectual component, i.e. information processing, analytical and conceptual thinking and the motor component

– Social competence – covers intellectual aspects (practical and social intelligence) and aspects of independent intellectual areas (character, temperament).

All the mentioned definitions have one common feature, and that is that competence is defined as a personal quality that is connected with performance, e.g.:

- The ability to behave in a way that corresponds to the requirements of work in various parameters of the organisation's environment and to achieve the desired results (Boyatzis, 1982);
- Ability and willingness to apply new skills and knowledge in new situations (Burgoyne, 1988);
- Basic skills and abilities that are necessary to perform a good job (Furnham, 1990);
- Essential human characteristics that lead to efficiency or excellent and quality performance (Mansfield, 1999) and others.

Competencies can be identified through empirical and theoretical procedures. Empirical procedures have only an information character for a particular area; they are difficult to compare and apply. Theoretical procedures have a basis in scientific theories and use scientific methods of investigation. The result is a taxonomy of competencies, from which the ones mentioned above are often used. Veteška (2009) states, e.g., research by Belz and Siegrist, who analysed the requirements for an applicant for a managerial position listed in advertisements.

The issue of competencies, i.e., their formation and needs for an individual in today's modern society, is closely related to the definition of competence and key competence. However, this process has not yet been completed, so it is a question of when it will be completed and firmly established in the current conditions and future society, whose main characteristic is rapid development.

As mentioned above, the main prerequisite for successfully forming competence is lifelong education and the support of society. Lifelong learning is a continuous learning process from birth and lasts until death.

Initial education includes all formal education, which is structured into three levels (CZSO, 2008):

- Basic education – primary and lower secondary (ISCED 1,2);
- Secondary education – upper secondary, which is completed by a school-leaving exam or a teaching certificate (ISCED 3, 4);
- Tertiary education – post-baccalaureate and is carried out at universities or higher vocational schools (ISCED 5, 6).

Formal education can be obtained in educational institutions where educational goals, contents, organisational forms, and assessments are determined by legislation. Even if it does not serve to obtain a proper degree of education, informal education can be obtained through various courses (retraining, foreign languages, driving motor vehicles), seminars, lectures,

training, etc. Informal education is learning based on everyday activities and experiences acquired in the family and personal environment, including self-education. However, it is unorganised and unsystematic.

Further education is a way of learning that begins when an individual completes a certain level of education and enters the workforce. The focus of work can be professional, interest or civic education, i.e., rights and obligations of citizens within society and family.

At the end of the last century, lifelong learning became the main topic for several international organisations due to the rapid development of national economies, e.g., OECD and UNESCO. In recent years, due to the creation of the European Union, its bodies, such as The Council of Europe, the European Commission, and the European Parliament, and the educational programmes they supported. Since the mentioned institutions have different focuses, they agree, for example:

- The OECD supports the concept of periodic education as the main principle (recurrent education), with the help of which lifelong learning is achieved (OECD, 2009);
- The Council of Europe, more precisely the Council for Cultural Co-operation of the Council of Europe, covers permanent education (Council of Europe, 1973).

By the term key competencies, we mean those skills and abilities that will help an individual to properly integrate into society and into social and working life, where he can perform work in various positions and functions, solve problems of unpredictable nature and cope with rapid changes at work and in his personal life. These competencies are of great importance for the individual and also for society. Therefore, these competencies are already developed in primary and secondary schools. (Turek, 2003).

Based on several sources and several international comparative studies (PISA, PIRLS), the following list of key competences is formed:

- Literacy in mathematics
- Literacy in natural sciences
- Literacy in reading
- Cognitive competence
- Communicative competence
- Information and communication technology
- Learning to learn
- Social competence
- Civic competence
- Personnel competence.

2.2 Evaluation of the Textbook and Didactic Text

The textbook is one of the main factors that determine and decide the quality of the teaching process. Since the textbook plays a significant role for the student and is an important aid, a theory in pedagogy for determining the quality of the didactic text should also be developed.

According to the results, more extensive research should be done on textbooks and didactic texts. Methods aimed at evaluating the quality of textbooks can be divided into three groups (Turek, 2010 and Dzíbela, 2019):

a) Experimental methods

With the help of a pedagogical experiment, we can most objectively determine the quality of the textbook. The independent variable that is manipulated is the textbook and the teaching text. In the experimental group, the pupils have a new textbook, and the control group has the original textbook. For both groups, the intervening variables are the same (teaching goal, teacher, students, classroom, teaching procedure, etc.) After the end of this experiment, knowledge, attitudes, and skills are compared for both studied groups.

b) Expert methods

Expert methods evaluate the adequacy, methodical processing, interest, difficulty and other properties of textbooks and didactic tests based on the statements of specific groups of observers – experts, students, teachers, lecturers, etc. Depending on the textbook's focus or didactic text, we can modify the evaluated properties and change individual elements – expand or shorten them, change their meaning, separately evaluate individual chapters, etc.

c) Statistical methods

Statistical methods examine various subject matter properties that are achieved through measurement. We include here:

- Average length of the text – the number of words per lesson.
- Degree of difficulty of the text – the so-called Nestler's method modified by Prúch (1984) & Pluskal (1996). This difficulty determines the language and scope complexity of the potential reader.
- Readability of the text – the Cloze test, fog index, haze index, etc., are used for determination.

Cloze test

The cloze test is based on a random text selected from a didactic text or textbook to meet the length of approximately 250 words. Then the first 35 words remain intact, but after that, the 36 and every 10 words have been removed or hidden. Twenty words are thus removed. Then this test is given to a specific group of students for whom the textbook is intended. If students do not complete at least 13 words, the gist is the difficulty **index.**

A text of 100 words is selected from a textbook or didactic text. More similar samples are recommended for more effective results. We add all long words (three or more syllables) in the given samples. After the words are counted, the average sentence length in the samples is calculated by the total number of words in the samples by the number of sentences. The formula is used for calculation:

(Average length of sentences +number of long words) x2/5+5

The ideal result is 12. The classroom has a good rating if the result is 11 or less.

Haze index

A sample of approximately 100 words is selected from the textbook. Also, similar to the fog index, the more samples, the better and more effective. In the selected samples, the average number of words and the percentage of long words (three and more syllables) are calculated. Subsequently, according to the relationship, the following is calculated:

IZ=(PSV +%DS)x 0.4

PSV – the average number of words in an essay

%DS – the percentage of long words

The result tells us how long the student takes to read and understand the text. If, for example, IZ=17, the student must be 17 years old for the given teaching text (applies to English texts). The smaller the IZ value, the more accessible it is to students. In the index, be mitigated by shortening and simplifying sentences.

2.3 Didactic Text for the Subject Work Management of the Reception Technician

The aim of the teaching subject Management of the work of a reception technician is to provide the basic knowledge, skills, and techniques that a qualified receptionist must master. This subject includes knowledge and skills from the field of psychology and sociology – the field of customer segmentation, customer typology, etc.

The subject requires knowledge and inter-subject relations with the subjects of economics in the part of the repair price calculation, as well as knowledge and inter-subject relations with subjects of the basics of the law of contracting and contract changes. This subject is widely multi-subject and, therefore requires attention and knowledge of already completed subjects.

In the teaching subject Management of the work of a reception technician, we use educational and educational strategies for the formation and development of the following key competencies, which enable pupils to:

The ability to interactively use knowledge, information, and communication technology to communicate in the state, native and foreign languages:

- verify and interpret the obtained data.
- work with essential information and communication technologies.

Ability to act independently in social and work life:

make clear agreements.

Based on the decision of the subject commissions, we will develop the following competence within this school education programme:

Ability to act independently in social and work life:

- to justify their arguments, solutions, needs, rights and actions.

The elaborated didactic text about Management of the work of a reception technician contains chapters:

1. From recipient to repair to service advisor
   - Service cycle
   - Meaning of service advisor
   - Description of the service advisor function

2. Opening the order and taking the vehicle to the service centre
   - Motor vehicle repair procedures
   - Order opening
   - Warranty and warranty conditions
   - The warranty repair liquidation process
   - The process of liquidation of insurance claims
   - Identification of the type of failure
   - Car diagnostic
   - Determining the scope of the repair
   - Determination of the type and number of spare parts
   - Own products
   - Products of subcontractors
   - Presentation of the repair solution
   - Negotiation
   - Taking over the vehicle according to company standards
   - Entering the order into the system
   - Delivery of the vehicle to the workshop
   - Possibilities of renting a spare vehicle
   - Changes to the scope of the repair
   - Communication with the customer – approval of the change

3. Realization of motor vehicle repair
   - Performing diagnostics
   - Informing the customer about the progress of the repair
   - Checking the progress of the repair
   - Provision of substitute goals
   - Order, Expense, Receipt,
   - Order, Invoices

4. Handing over the vehicle to the customer
   - Implementation of exit control

- Elimination of deficiencies
- Development of service documentation
- Explain the course of the repair to the customer
- Explain the price of the repair to the customer
- Explain the options and conditions for a repair claim
- Hand over the keys and documents to the customer, and see the customer off
- Determining satisfaction with the repair

Kowalski, M. and Sztangret also deal with the mentioned issue. M. (2012) and Bryła, K., Kowalski, M. (2011).

3 Survey

The main goal of the research is the processing and evaluation of the didactic text about the subject of Management of the work of the admissions technician in the field of study 2493 L vehicle sales and service.
In addition to the main goal of the survey, we also investigated other goals:

- Statistical evaluation of properties for the processed didactic text;
- Comparison of the assessment level of individual experts.

The subject of the research is the creation of a didactic text, the assessment of the degree of difficulty of the didactic text and the determination of the readability of the didactic text.
I conducted the research at the following selected schools: Secondary Vocational School of Automobile Trnava, Secondary Vocational School of Electrical Engineering Trnava, Secondary Vocational School of Mechanical and Electrical Engineering Levice, Secondary Vocational School of Mechanical and Electrical Engineering Velešín, Secondary Vocational School of Mechanical and Electrical Engineering České Budejovice and Secondary Vocational School of Mechanical and Electrical Engineering Tábor.

3.1 Research Hypotheses

The main starting hypothesis:
The didactic teaching text for the subject Management of the work of a reception technician will be manageable in the 2nd year of the study field 2493 L vehicle sales and service.
In order to verify and confirm the mentioned hypothesis, it is also necessary to verify the following working hypotheses:

H1: Traits will be rated from 0 to +2 more than 50% of the time
H2: Individual experts will have an evaluation level of more than 60%

Methods will be used in the investigation of hypotheses.
The experiment had two parts:

- Preparatory part;
- Experimental part.

In the preparatory part, we dealt with:

- Preparation of materials and processing of didactic teaching text;
- Preparation of questionnaires for teachers of technical subjects.

In the preparatory phase of the experiment, the questionnaire for teachers was processed based on a standardised questionnaire (Turek, 2010). Using this questionnaire, we evaluated the methodological processing of the didactic text, its quality, appropriateness, interest, etc. The evaluations were carried out by teachers of technical subjects (table 1) focusing on engineering and electrical engineering schools.

School	Number of teachers	Focus of school
SPŠSaS Tábor	2	engineering
SOŠSaEV Velešín	1	engineering
VOŠ, SPŠ and SOŠŘaS Strakonice	1	engineering
SPŠ Levice	1	engineering
SOŠE Trnava	1	electrotechnical
SOŠA Trnava	2	engineering

Table 1: Number of teachers, the focus of schools

The evaluation scale -2, -1, 0, +1, +2 was used, which was intended to evaluate the didactic teaching text by teachers (experts).

3.2 Evaluation of the Experiment

As part of hypothesis 1, we investigated the opinion of 8 teachers of professional subjects on 21 features of the didactic text. The results are shown in tab. 2.

Evaluative characteristic	1 exp. SPŠSaS Tábor	2exp. SPŠSaS Tábor	3 exp. SOŠSaEV Velešín	4 exp. VOŠ, SPŠ a SOŠŘaS Strakonice	5 exp. SPŠ Levice	6 exp. SOŠE Trnava	7 exp. SOŠA Trnava	8 exp. SOŠA Trnava	PŠH
a	1	2	0	1	2	2	1	2	1.38
b	0	1	2	1	2	1	1	1	1.13
c	2	1	2	2	2	2	2	2	1.88
d	1	1	2	2	1	2	2	1	1.50
e	0	1	1	1	1	1	2	0	0.88

f	0	1	1	0	2	1	1	0	0.75
g	0	1	1	0	1	1	1	0	0.63
h	0	1	1	0	1	2	2	0	0.88
i	1	2	2	1	1	1	2	0	1.25
j	2	2	1	2	1	0	2	2	1.50
k	2	2	2	1	1	0	1	2	1.38
l	1	2	0	1	2	0	2	1	1.13
m	2	2	0	1	2	1	1	1	1.25
n	1	1	0	1	2	1	2	2	1.25
o	1	1	0	1	1	1	1	2	1.00
p	1	0	1	1	2	1	2	2	1.25
q	1	0	2	1	2	1	2	1	1.25
r	1	0	1	1	1	1	1	1	0.88
s	1	0	1	2	1	1	0	2	1.00
t	1	2	2	0	1	1	0	2	1.13
u	2	1	2	0	1	2	0	1	1.13
v	0	1	2	1	2	1	0	1	1.00
w	0	1	1	1	1	2	0	0	0.75
x	0	2	1	2	2	1	0	0	1.00
y	2	2	0	2	1	1	0	0	1.00
z	2	1	0	1	2	1	0	0	0.88
aa	1	1	1	2	1	2	1	2	1.38
bb	2	1	0	1	2	2	1	1	1.25
Average	1.00	1.18	1.04	1.07	1.46	1.18	1.07	1.04	

Table 2: Evaluation of experiment by teachers

The investigated questionnaire questions were properties such as content correctness, compliance with the curriculum, clarity of expression and clarity, connection of theory with practice, simplicity, appropriateness and interest, the content side of the curriculum, arrangement of the curriculum into a system, inter-subject relationships and clarity and concreteness of the curriculum, etc.

3.3 Verification of Hypotheses

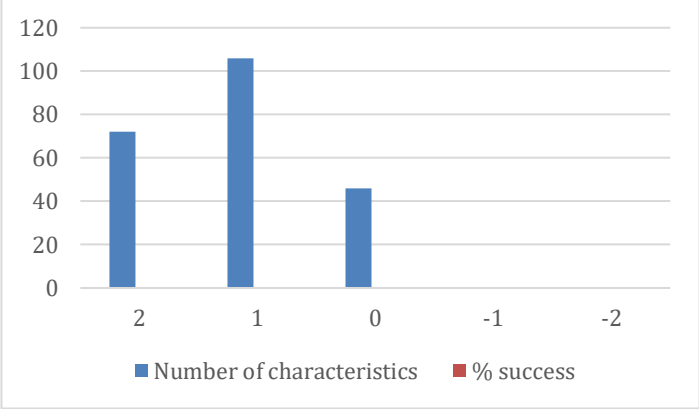
H1: Traits will be rated from 0 to +2 more than 50% of the time.
To verify this hypothesis, we used questionnaires filled in by teachers (experts) of technical subjects. With these questionnaires, teachers (experts) expressed their opinion about the

Management of the work of admissions technicians. The overall evaluation of the teacher's (experts) questionnaires is in tab 3.

H	Number of characteristics	% success
2	72	32%
1	106	47%
0	46	21%
-1	0	0%
-2	0	0%

Table 3: Evaluation of each specific characteristic

A total of 224 characteristics were evaluated by teachers (experts), which is a 100% scale from -2 to +2. Ratings -1 and -2 were not used by teachers (experts), so this rating represents 0% of the overall rating. Graph 1 presents the assessment by teachers. As can be seen from the graph, the highest rating was 1 in 106 properties, so 47%. This was followed by a rating of 2, awarded to 72 properties, representing 32%. 46 properties were rated zero, so 21%. The scale from 0 to 2 was used at 100%.



Graph 1: Evaluation of characteristics by teachers

It follows from the above that hypothesis H1 is valid. More than 50% of the properties were rated on a scale from 0 to 2. Teachers (experts) rated 100% of the properties on the given scale from 0 to 2.

H2: Individual experts will have more than 60% evaluation.
Hypothesis No. 2 was verified by a questionnaire for teachers (experts). With the help of a questionnaire, we learned their attitudes towards the didactic text about Management of the work of an admissions technician. The evaluation of the questionnaire can be found in tab. 2. The evaluation results by experts are shown in the tab. 4.

Evaluative characteristic	1 exp. SPŠSaS Tábor	2 exp. SPŠSaS Tábor	3 exp. SOŠSaEV Veleš ín	4 exp. VOŠ, SPŠ,SOŠŘaS Strakonice	5 exp. SPŠ Levice	6 exp. SOŠE Trnava	7 exp. SOŠA Trnava	8 exp. SOŠA Trnava
Average	50.00	58.93	51.79	53.57	73.21	58.93	53.57	51.79

Table 4: Experts' evaluation

It follows from the above that hypothesis H2 does not apply. Individual experts had an evaluation level below 60%.
Only one expert achieved the expected level of assessment. The remaining experts had an evaluation level lower than 60%.

3.4 Summary of Results and Recommendations

This study aimed to develop and evaluate a didactic teaching text for the subject Management of the work of a reception technician in the field of study 2493 L vehicle sales and service.
In order to fulfil the set goal, we established two sub-hypotheses. These sub-hypotheses assumed the fulfilment of the main hypothesis – to process and evaluate the didactic teaching text for the subject Management of the work of the reception technician in the field of study of 2493 L vehicle sales and service.
The research sample was based on eight teachers of professional subjects.
Table 5 below contains a summary of the verified hypotheses.

Hypothese	Method	Verification of hypothese	Investigated effect
H1	Questionnaire	Apply	Teaching text properties
H2	Questionnaire	Not apply	Rating level of evaluated characteristics

Table 5: Summary of verified hypotheses.

We assume that the didactic textbook will help students who plan to study the subject Management of the work of a reception technician in the field of 2493 L vehicle sales and service. This didactic teaching text can also be used for self-study to extend or consolidate knowledge from school teaching. It is ideal for this text if it is presented to students in electronic form.
According to the processed experiment, we recommend:

- expand the scope of the text, thereby achieving a better development of key competencies;
- make the text available to students on the school website.

4 Conclusion

Key competencies are essential for every educated person. The basis of success in life is the effective development and improvement of skills, habits, experiences, and attitudes. The development of key competences can take place with the help of material teaching aids, which include textbooks and didactic teaching texts. However, material didactic resources should be used reasonably and not put pressure on the student. If necessary, he will give feedback to the teacher if he considers the given resource uninteresting. In that case, the teaching tactics must be changed so that the teaching process engages the student again.
According to professional practice, the school provides education, various professional courses, and material didactic tools, which are one factor in fulfilling the learning goal, increasing the clarity of the subject matter, and better establishing the topic covered.

With the help of the didactic teaching text, the student develops his key competences, such as information literacy, which also includes reading literacy and reading comprehension. As part of the PISA assessment, we have a low reading literacy level in Slovakia. Slovakia has been participating in PISA testing since 2000; unfortunately, the results are unfavourable.

The mentioned didactic teaching text in the field of study 2493 L sales and service of vehicles is one of the possibilities to develop your key competencies and reading comprehension, which our students often lack.

The test sample consisted of 8 teachers (experts) who are from Slovakia and the Czech Republic. Research has shown that the mentioned didactic teaching text is manageable for the target pupils. Didactic textbooks can help students improve their advanced competencies, which they can apply in professional practice and with a future employer.

References

Bryła, K., & Kowalski, M. (2011). Symulacje przepływu płynów z wykorzystaniem aplikacji inżynierskich Źródło: Annales Universitatis Paedagogicae Cracoviensis. Studia Technica, *4*, s. 3-9.

Dzíbela, F.: Rozvoj kľúčových kompetencií žiakov v manažmente práce prijímacieho technika. [Rigorózna práca] Vysoká škola DTI v Dubnici nad Váhom.

MINISETRSTVO ŠKOLSTVA SR: Zákon č.245/2008 Z.z. z 22. mája 2008 o výchove a vzdelávaní (školský zákon) a o zmene a doplnení niektorých zákonov [online] 2008. [cit. 11.1.2019]. https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2008/245/20190102

Hrmo, R., Škrabánková, J., Kučerka, D., & Kmec, J. (2016). *Kľúčové kompetencie v technických a prírodovedných predmetoch*. Varšava: Vydavateľstvo Wyzsza Szkola Menedzerska w Warszawie, Poľsko, ISBN 978-83-7520-204-5.

Kolektív autorov, (2010). Školský vzdelávací program pre predmet Manažment práce servisného poradcu, interné materiály SOŠA Trnava.

Kowalski, M., Sztangret. M. (2012). *Komputerowa analiza wpływu zmian geometrii nadwozia pojazdu na współczynnik oporu aerodynamicznego* Źródło: Annales Universitatis Paedagogicae Cracoviensis. Studia Technica, *5*. s. 97-104.

Šimonová, I. a kol. (2011). *Klíčové kompetencie a jejich reflexe v terciárním e-vzdělávaní.* ISBN 978-80-86771-46-5.

Veteška, J. (2010). *Kompetence ve vzdělávání dospělých. Pedagogické, andragogické a sociální aspekty.* Vydavateľstvo Univerzita Jana Amosa Komenského Praha, ISBN 978-80-86723-98-3.

Noise Monitoring in the School Metal Workshop

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DOI: https://doi.org/10.53349/resource.2023.is1.a1194

Abstract

The study deals with the issue of noise in the school facility, in the school metal workshop, its measurement and evaluation of the results. The purpose of the carried-out study was to monitor and assess the conditions in which the students learn and work there and point out the shortcomings concerning noise's impact on human health. At the same time, the study aimed to optimise the workplace or workshop by legal regulations. Based on the monitoring results, several critical places were found where the limits were exceeded. A 3D noise propagation model modelled according to the measured results was created, allowing us to understand noise propagation better. Finally, the conducted study resulted in suggestions for improving the working conditions in the monitored school facility and for increased safety and health protection of students at work.

Keywords: Noise, Measurement, Metalworking workshop, Software visualisation, Noise load

1 Introduction

In daily life, we face different kinds of, like speech, music, and natural sounds. However, noise, defined as unwanted sounds, adversely affects human health. The World Health Organization defines human health as not just for lack of health but also physical, mental, and social well-being and happiness (Demirkale, 2016). Noise is an unpleasant, commonly loud sound to which workers in manufacturing and other industries worldwide are exposed daily. However, it can also be found in schools (Sajin et al., 2019, pp. 80 – 97), (Xie et al., 2011, pp. 551 – 555), (Vilcekova et al., 2017, p. 120, 29 – 40), traffic (Wang et al., 2017), bars, orchestras, and personal music players (Argalasova et al., 2016, pp. 535 – 541). For workers exposed to noise,

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it is important to follow the noise levels at their workplace regularly to evaluate the level of risk for hearing losses and damages and, accordingly, take measures for managing or preventing risks. Noise in the working environment and particular workplaces presents several risks for employers, either by direct effects such as hearing loss and possible deafness by the time of retirement or by extra-aural effects from long-term noise exposure, resulting in psychical problems, harmful effects on the autonomous nerve system, cardiovascular system or the organism in general (Vujica et al., 2020). Globally, about 16% of disabling hearing loss in adults is due to occupational-related noise (Mohamed, 2017).

Noise in the working environment of the school's metalworking workshop can disturb students and hurt their concentration; also, it can be a potential risk threatening their health. The main goal of the presented case study was to process the objectification of noise in the school's metalworking workshop and to compare the achieved results with legislative limit values. Based on comparing the measured values with the limit values determined by the Slovakian legislation, noise reduction solutions were proposed to achieve an effective acoustic design and ensure the control of noise hazards when working on machinery.

2 Description of the Monitored Space and the Noise Monitoring Method

2.1 Characteristics of the Monitored Area

The object for which a case study was carried out to objectify noise in its environment was a school metalworking workshop located in the Nitra region. The secondary vocational-technical school focuses on mechanical engineering and mainly on producing, assembling, and repairing devices and machines, including machinery repair. In the practical part of the curriculum, students spend most of their time in the metalworking workshop, which is the subject of a case study. In the monitored workshop, various practical activities related to mechanical and manual work, including the operation of machinery, are carried out. The graphic diagram of the room’s floor plan was processed using AUTOCAD software, with precisely defined dimensions of the workshop space.

The school's metalworking workshop has the following dimensions: length 6.31 m x width 4.49 m x height 2.98 m^2. The workshop contains one double-wing door marked D1, and one single-wing door marked D2, which are marked on the project view of the workshop Fig. 1. Dimensions of single-wing door (D2): 0.89 x 2 m and double-wing door (D1): width 2 x (0.89 x 2 m). The workshop is equipped with natural ventilation through six window openings. The dimensions of the window (O1) are: width 0.71 m and height 1.94 m, and the dimensions of the window (O2) are: width 1.94 m and height 1.94 m. The layout shop and the metalworking machines are shown in Figure 1-5. The layout of the machines is shown in the project representation of the metalworking workshop in Fig. 6.

Fig. 1: Lathe type C8C universal

Fig. 2: Bench drill type FA-13

Fig. 3: Grinder TM2BR

Fig. 4: Vertical milling machine type FUS-22

Fig. 5: Stand drill type FO-20

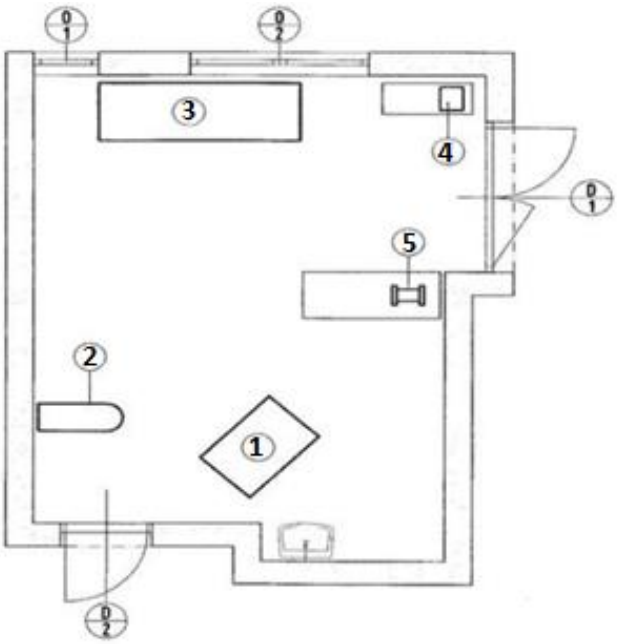

Fig. 6: Project representation of the layout of the machines (VAS et al., 2005). 1 Vertical milling machine type FUS-22; 2 stand drill type FO-203; 3 lathe type C8C universal; 4 bench drill type FA-13; 5 grinder type designation TM2BR

Using the ultrasonic laser distance measurer MEASURE LASER, we determined the measurement points for noise measurements depending on the location of the metalworking machines. Determination of the measurement points depends on the machine and the student who performs the work on the metalworking machine. The height of the measuring points was 1.5 m to 1.6 m above the floor surface at the zone near the students' hearing organs. The measurement locations are marked in Fig. 7 and indicate the student's position when operating the machine.

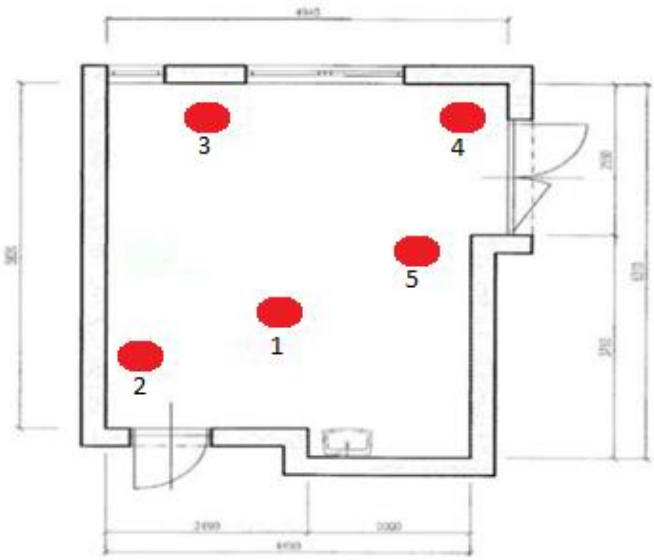

Fig. 7: Places of performed measurements

In the first step, we created a floor plan of the monitored space with the exact dimensions of the walls. Using the SKETCH UP software, a 3D model of the monitored space was modelled according to the entered input values, which are shown in Fig. 8.

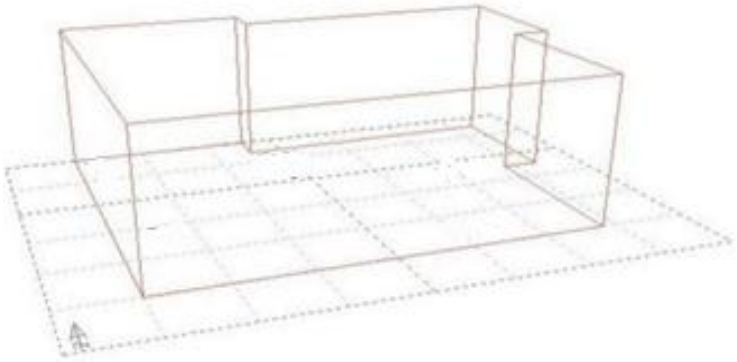

Fig. 8: 3D model of the monitored space

The room model was flipped into the ECOTECT ANALYSIS software, which allowed observing the propagation and reflections of noise in the given space, shown in the following Fig. 10, 12, 14, 16,18.

2.2 Measurement of Monitored Quantities

The TESTO 816-1 device was used for noise measurement. The basic parameters of the device are listed in Table 1. The dimensions of the monitored space for more accurate results were measured using an ultrasonic laser distance meter MEASURE LASER.
Table 2 shows the basic technical parameters.

Memory	31,000 measurements
Operating temperature	0 to +40°C
Weight	390g
Dimensions	272 x 83 x 42 mm
Battery type	4x AA battery
Measuring range	30 to 130 dB
Accuracy	± 1.4 dB
Resolution	0 Hz to 8 kHz

Table 1: Technical parameters of the TESTO 816-1 sound meter

Measured units	Meters/feet
Operating temperature	0 to +43°C
Max – min range	0.45 m to 17 m
Dimensions	150 x 70 x 30 mm
Battery type	9V alkaline battery
Operating frequency	40kHz
Accuracy	±0.5%
Resolution	two decimal places, e.g., 1.11 m

Table 2: Technical parameters of the ultrasonic laser distance meter MEASURE LASER

Sound intensity level

From a physical point of view, the decibel is a dimensionless scale that expresses the ratio of two values. Noise intensity **I** and sound intensity level **L** are expressed on a logarithmic scale by the relation:

$$L_1 = 10 \log (I/I_0) \quad (1)$$

I_0= hearing threshold intensity (10 – 12 $W.m^{-2}$).

The formula for calculating sound pressure (dB)

$$L_p = 20 \log (p/p_0) \quad (2)$$

p = acoustic pressure of the measured sound (Pa)
p_0= sound pressure corresponding to hearing pressure = 2.10^{-5} Pa
L_p= 0 dB = hearing threshold
L_p = 140 dB = pain threshold.

As the noise measurement was carried out on the machines and facilities in the case study design, the individual machines were first started up individually and then simultaneously in order to record the synergistic effect of the overall noise level. The measurement was carried out so that the noise spread to the zone of the following machine was recorded, the zone where the student or teacher performs work. This state represents a situation that can, with high probability, occur during practical teaching.

The measurement was carried out in the time from 9:00 a.m. to 3:00 p.m. Five students worked in the metalworking workshop, working individually on machinery (milling machine, stand drill, lathe, bench drill, two-disc grinder).

3 Results of individual measurements and their discussion

The first measured data was the noise in the metalworking workshop without the machinery turned on. This value was 33.9 dB. Subsequently, measurements were carried out for individual machines in designated locations. At the same time, modelling identified zones of noise propagation in the space, that is, places where students and teachers may be exposed to excessive noise from running equipment during work.

3.1 Noise measurement at the milling machine

The measurement was carried out at the maximum speed of the cutter, 1800 revolutions per minute (Instructions for the device vertical cutter FUS-22). The average value for the cutter (point 1) was 80.21 dB (Table 3). Suppose a student was to work in a work environment for 8 hours with a milling cutter. In that case, it is more than likely that the value of 80 dB will be

exceeded, which we include in the IV group of work, which includes noisy machines and tools or activities performed in a noisy environment. Based on the above, we can conclude that this device does not meet the conditions of noise in the working environment. It is recommended that the necessary safety precautions must be taken on this device.

Measurement point	Noise measurement number (dB)							Average
	1	2	3	4	5	6	7	
Point 1	**79.8**	**79.9**	**80.1**	**80.2**	**80.5**	**80.3**	**80.7**	**80.21**
Point 2	71.8	71.8	78.1	78.8	79.1	79.5	79.7	**76.97**
Point 3	77.5	77.7	77.4	77.4	77.7	77.5	77.6	**77.54**
Point 4	77.3	77.4	77.6	76.9	77.0	77.2	77.1	**77.21**
Point 5	77.1	77.1	78.5	76.0	76.9	77.6	77.3	**77.21**

Table 3: Noise measurement at milling machines in the surrounding control points at the machines

Figure 9 shows measurements in individual locations with the cutter turned on.

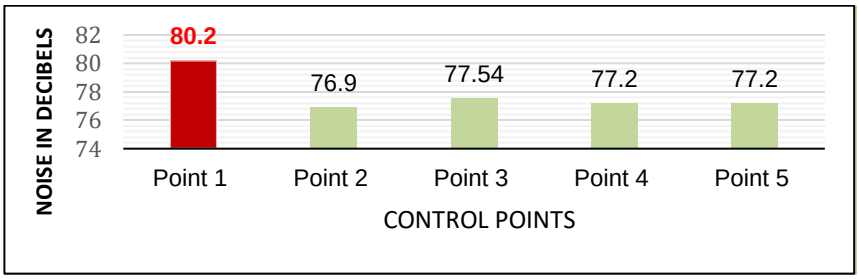

Fig. 9: Noise values measured at control points – point 1 when the cutter is running

The visualisation of sound propagation and its reflection in the Ecotect Analysis program is shown in Fig. 10. The 3D model of the room shows possible noise propagation at the height of 1.5 – 1.6 m from the mill.

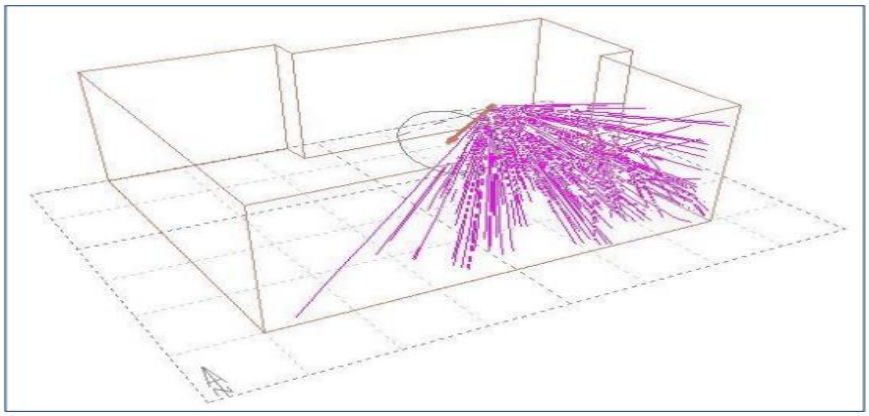

Fig. 10: 3D visualization of the noise propagation direction for the cutter

Sound reflections are reflected in a specific part of the room where the standing drill is placed. The employee or the student who will operate the standing drill was in a space where the noise was reflected and spread. Appropriate measures must be implemented so that the noise exposure of the equipment operator is maximally reduced by organisational measures or by assigning effective personal protective work equipment.

3.2 Noise Measurement at a Stand Drill

The measurement was carried out at a maximum of 2000 revolutions per minute of the device (Instructions for the grinder TM 2 BR B150). The results of the noise measurement for the standing drill (point 2) are shown in Table 4. The average noise value when working on the standing drill was 73,14 dB. If the student worked in the work environment for 8 hours, it is more than likely that the equipment met the requirements of the standardised sound level for the IV group of work and activities in a noisy environment, the value of which is less than 80 dB.

Measurement point	Noise measurement number (dB)							AVERAGE
	1	2	3	4	5	6	7	
Point 1	68.5	68.2	68.3	68.2	67.9	68.1	67.4	68.08
Point 2	71.1	68.1	70.3	74.5	75.7	76.2	76.1	73.14
Point 3	65.3	64.7	67.4	62.8	67.0	66.5	66.2	65.70
Point 4	66.3	65.7	65.5	66.8	66.4	66.7	64.6	66.00
Point 5	65.1	63.9	63.3	66.7	64.5	65.1	66.2	64.97

Table 4: Measurement of the noise of the standing drill and in the surrounding control points at the machines

Figure 11 shows the measurements in individual stations with the standing drill turned on.

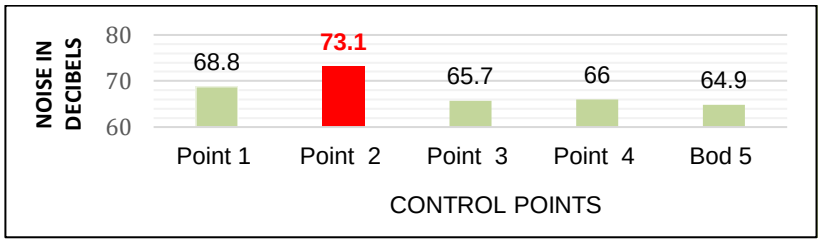

Fig. 11: Noise values measured at control points – point 2 at the standing drill

During the operation of the standing drill, it is possible to see sound reflections in different directions. Since the standing drill was stored against two walls, sound reflections bounced off in two directions. One towards the student who operates the stand drill, but also towards the student who operates the milling machine (Figure 12).

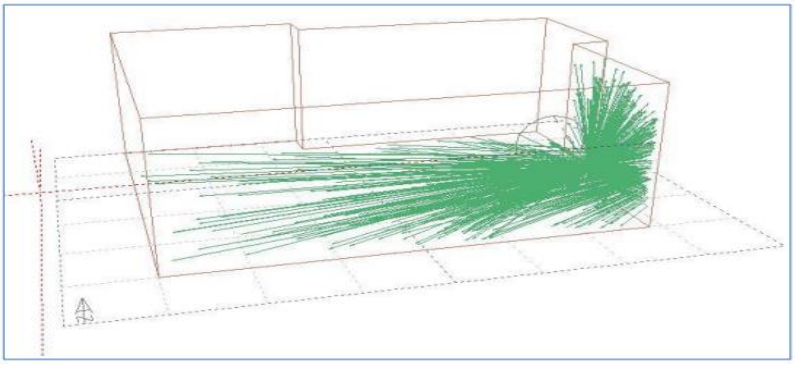

Fig. 12: 3D visualisation of the direction of noise propagation for a stand drill

3.3 Noise measurement at the lathe

The measurement was made at the maximum 1800 revolutions per minute (Bakič, n.d.) of the lathe (point 3) and at the other four control points. The average value at the lathe was 76.01 dB. The results of the noise measurement are shown in Table 5. During an 8-hour work on the lathe, it is highly likely that the equipment meets the requirements of the standardised sound level A of the IV group of work and activity in a noisy environment, the value of which is less than 80 dB.

Measurement point		Noise measurement number (dB)							AVERAGE
		1	2	3	4	5	6	7	
Point 1		72.6	73.4	73.2	75.1	74.5	75.2	75.0	**74.14**
Point 2		74.0	74.8	73.0	72.9	73.1	73.3	72.8	**73.41**
Point 3		75.4	76.4	76.0	76.1	75.3	75.7	77.2	**76.01**
Point 4		73.6	72.6	72.4	73.1	72.6	73.0	73.1	**72.91**
Point 5		73.8	73.9	72.8	74.5	72.9	73.8	73.7	**73.60**

Table 5: Noise measurement at the lathe and in the surrounding control points for other machines

Figure 13 shows the result of measurements in individual locations with the lathe turned on.

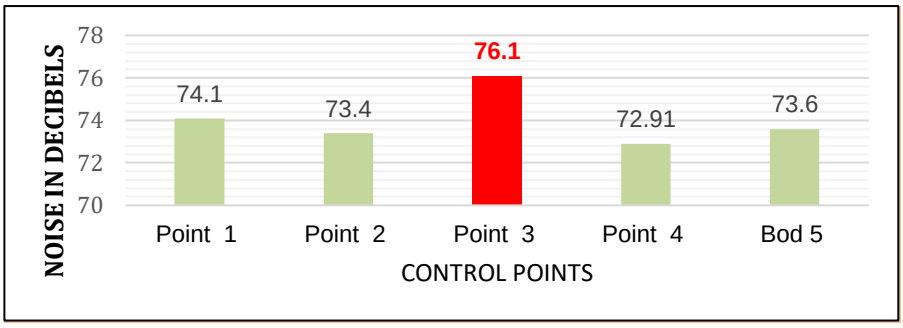

Fig.13: Noise values measured at control points – point 3 when the lathe is running

In the case of a lathe, whose 3D model shows sound propagation at a height of 1.5-1.6 m, the sound spreads to the entire environment of the space (Figure 14). When the lathe is started, the sound waves will hit all the machinery, with a high probability also the teachers and students in the workshop who are working on the machinery. Some of the sound waves are reflected from the front wall and return to the middle of the room, but as the model shows, the noise is reflected in the centre of the room and from the side walls, it is piled up to the centre of the room.

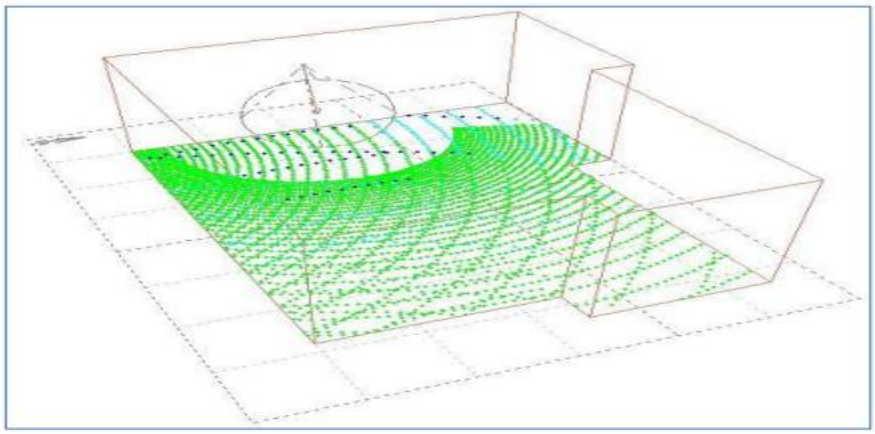

Fig. 14: 3D visualisation of the direction of noise propagation for a lathe

3.4 Noise Measurement with a Bench drill

The measurement took place at a maximum of 1800 revolutions per minute (Instructions for the device table drill FO-20) of the drill, where the average value at point 4 (for the table drill) was 70.20 dB. The results of the noise measurement are presented in Table 6. Based on the above, we can conclude that this device does not exceed the limit values for noise in the working environment. This means that even with an 8-hour exposure while working with a table drill, the normalised sound level A of group IV work and activity in a noisy environment would not be exceeded since the value is less than 80 dB.

Measurement point	Noise measurement number (dB)							AVERAGE
	1	2	3	4	5	6	7	
Point 1	61.3	63.6	63.5	65.4	65.8	67.9	65.4	**64.70**
Point 2	60.2	62.8	92.8	62.7	63.3	66.2	64.8	**67.54**
Point 3	61.8	60.0	61.9	65.0	62.8	67.1	64.1	**63.24**
Point 4	69.5	68.4	69.1	70.0	70.2	73.9	70.3	**70.20**
Point 5	63.7	63.2	63.6	63.4	63.9	67.0	64.2	**64.14**

Table 6: Measuring the noise of the bench drill and in the surrounding control points for other machines

Figure 15 shows the result of measurements in individual locations with the table drill turned on.

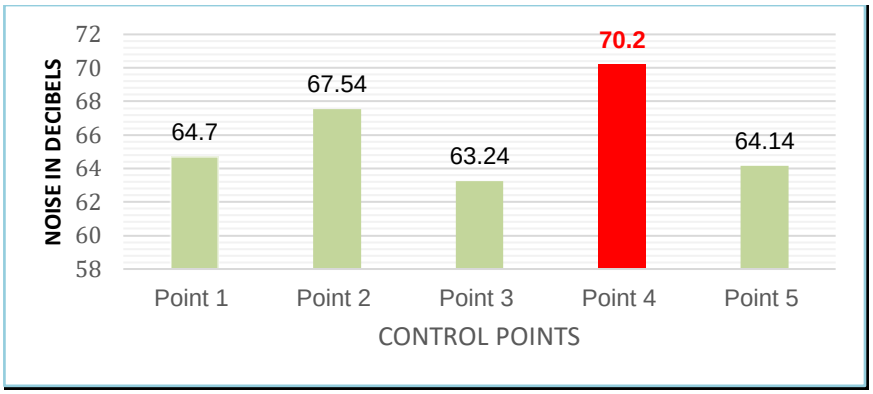

Fig. 15: Noise values measured at control points – point 4 with the table drill running

The 3D model shows the sound reflections for the bench drill (Figure 16). The location of the equipment and the propagation of noise confirm that the operator of the surrounding equipment is significantly exposed to the noise of the bench drill. The lathe and stand drill employees will be the most exposed; those who operate the milling machine and table drill will be less exposed to excessive noise.

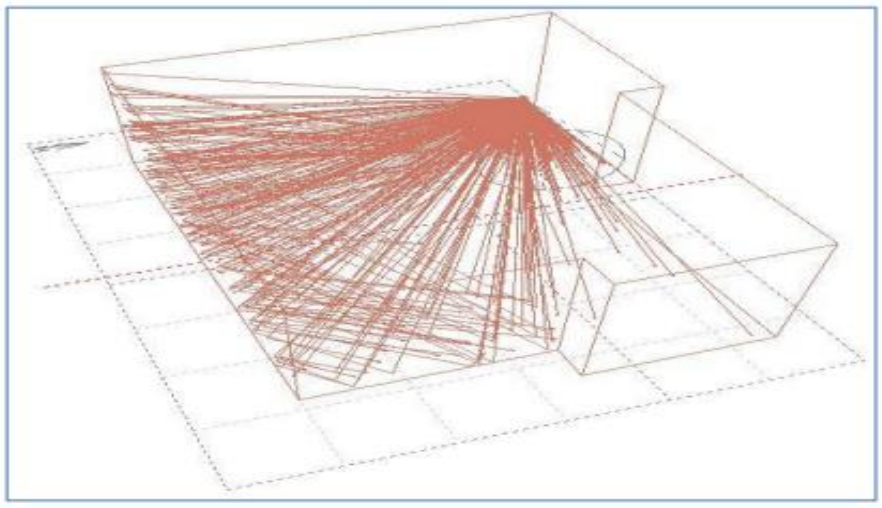

Fig. 16: 3D visualisation of the direction of noise propagation for a bench drill

3.5 Noise Measurement at a Double-disc grinder

The measurement was carried out at a maximum speed of 2840 revolutions per minute of a two-disc grinder (Instructions for the device sander TM 2BR B150). The average measured noise value at point 5 (double-disc sander) was 81,62. The measurement results are shown in Table 7. We can conclude that this device would not meet the conditions for noise; it is highly probable that if the employee, i.e., the student, worked on this equipment for 8 hours, the values of the normalised sound level A of the IV group of work and activities in a noisy

environment would have been exceeded, as the value of 80 dB was exceeded. This equipment also requires increased protection of employees, and it is necessary to prioritise the protection of the health of employees from exposure to excessive noise.

Measurement point	Noise measurement number (dB)							AVERAGE
	1	2	3	4	5	6	7	
Point 1	80.2	77.6	77.8	76.2	73.9	78.1	78.3	**77.44**
Point 2	79.0	74.7	74.2	77.5	75.0	77.3	78.2	**76.55**
Point 3	78.3	73.1	72.0	72.4	71.1	79.6	73.9	**74.34**
Point 4	80.9	76.7	74.0	73.8	75.3	79.8	73.9	**76.34**
Point 5	83.5	81.1	79.9	80.3	80.5	83.6	82.5	**81.62**

Table 7: Measurement of the noise of the double-disc grinder in the surrounding control points

Figure 17 shows the measured noise levels at individual stations when the two-disc grinder is switched on.

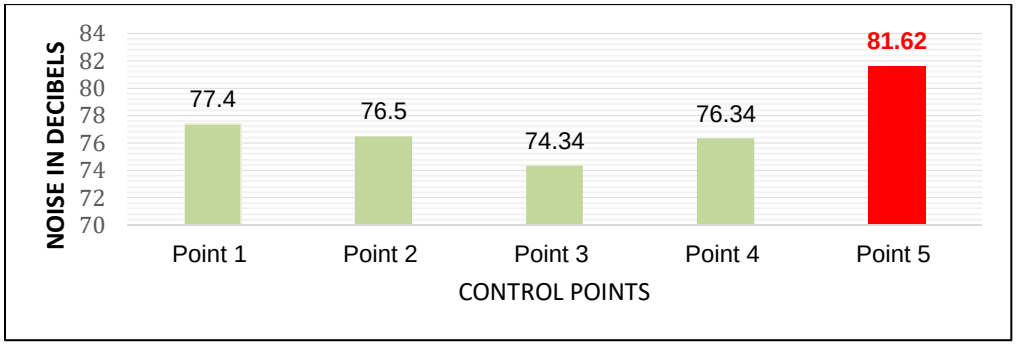

Fig. 17: Noise values measured at control points – point 5 with the double disc grinder running

The 3D model shows the noise reflections of the grinder (Figure 18). The highest noise exposure will be for the operator of the milling machine and the stand drill. Less reflected sound waves spread into the space near the lathe and table drill stations.

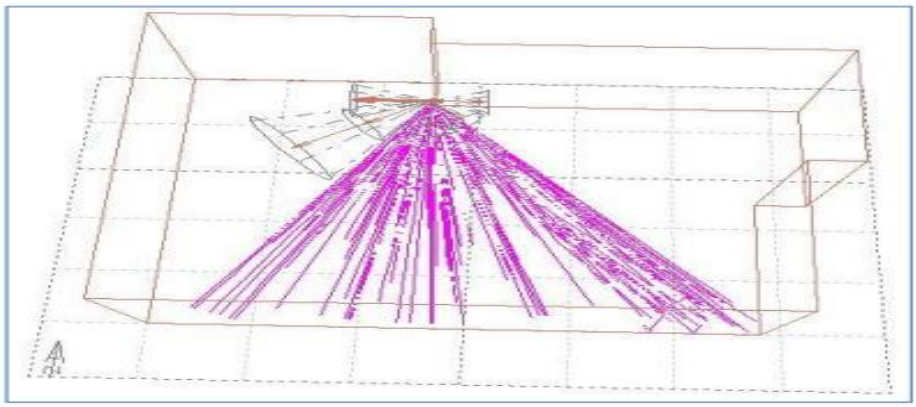

Fig. 18: 3D visualization of the direction of noise propagation for a two-disc grinder

3.6 Measuring the Synergistic Effect of Machine Noise

The measurement was made with all machines running simultaneously. The smallest average value of 81.1 was in point 4 (with a table drill), and the highest average value recorded was 83,2 in point 5 (with a double-disc grinder). The results of measuring the synergistic effect of the machines in the workshop are shown in Table 6. We can conclude that during an 8-hour exposure of students in the workshop with all five devices running at the same time, the values of the normalised level and sound of the IV group of works and activities in a noisy environment would be exceeded because the limit value of 80 dB was exceeded.

Measurement point	Noise measurement number (dB)							AVERAGE
	1	2	3	4	5	6	7	
Point 1	81.3	81.7	82.3	82.1	82.7	82.6	82.4	**82.15**
Point 2	81.4	81.0	81.2	81.8	82.3	84.7	83.2	**82.22**
Point 3	80.9	81.1	80.9	81.0	81.5	83.9	82.7	**81.71**
Point 4	80.7	80.2	80.3	80.8	80.4	83.3	82.0	**81.10**
Point 5	83.0	81.7	82.5	84.5	81.9	85.1	83.8	**83.21**

Table 8: Noise measurement at control points when all operating machines are switched on

Figure 19 shows the measured noise levels at individual stations with all machines in the workshop turned on.

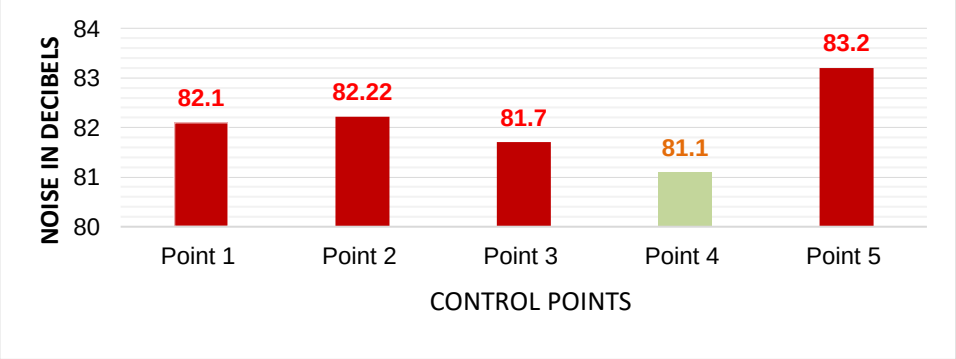

Fig. 19: Noise values measured at all control points with fully operating machines

4 Discussion

The measurements showed that the sound level is above 80 dB, which means exceeding the limit values for pupils and teachers in the workshop. Measures must be taken to reduce noise pollution. The measures would be of a technical and organisational nature.
Vas et al. (2005) claim that “noise level always depends on the technology”. An existing option to reduce noise is the replacement of machinery with more modern ones, which are insulated

against excessive noise by their construction. However, new equipment does not always mean lower noise exposure; this does not apply to grinders.

From an economic point of view, these technical measures are financially demanding. There are more modern devices on the market, for example, Bernardo CRL lathe (price € 51,330), milling cutter RCT-FS4030-2200-4A (price €12,054), bench drill OTPTdrill B (price €13,141), stand drill OTPdrill B 28 HV (price €2,363), TPgrind GU 20 grinder (price €163). The replacement of equipment would amount to approximately €66,050.

Another possibility is to reduce the noise by regular checks and revisions of machinery, in case of heavy wear, the equipment would have to be discarded.

If it is impossible to reduce the equipment's noise, organisational measures follow. This can be achieved by reducing the number of students in the workshop, organising the schedule for working with machines, shortening the machine operation time, or soundproofing the workstations with noise barriers.

A suitable solution is to change the positions of the machines in the workshop because it was 3D modelling that brought exciting results that the noise level of the equipment also depends on the location.

The last but necessary option to reduce noise in the workshop is allocating personal protective work equipment. Earplugs are the most suitable and cheapest solution. A proven alternative for hearing protection is plugging from the American company 3M and type designation E-A-R, which can reduce noise by 36 dB.

5 Conclusion

The main goal of the implemented case study is to highlight and map the noise measurement and evaluation issues in the working environment for individual machines. AUTO DESK Ecotect Analysis software was used, which showed us the direction of noise propagation in 3D modelling.

We evaluated the measured results in the school's metalworking workshop, which is equipped with a lathe, a milling machine, a stand drill, a grinder, and a table drill, and proposed several solutions. The most problematic machine was the cutter, the grinder and the synergistic effect after running all the equipment simultaneously. In the discussion, solutions were proposed to reduce noise of a technical and organisational nature and assign effective personal protective equipment.

For pedagogical practice, we suggest using the Autodesk Ecotect Analysis software to map noise propagation in space and better understand the importance of the correct arrangement of machinery.

ACKNOWLEDGEMENTS

The article was prepared with the financial support within the projects KEGA no. 014UKF-4/2020 “Innovative learning e-modules for safety in dual education” and KEGA no. 012UKF-4/2020 “Elektronické vzdelávacie moduly pre meranie faktorov pracovného prostredia“.

References

Albaum, G. (2012). The Likert scale revisited: an alternate version. *Journal of the Market Research Society*, p. 331.

Argalasova, L. et al. (2016). The Risks of Social Noise Exposure in the Vulnerable Population in Slovakia, *Archives of Acoustics*, *41* (3), pp. 535-541.

Bakič, P. Profesionálna expozícia hluku, možnosti ochorenie liečba (n.d.). http://www.vpl.sk/files/file/XXXIIpdf_prednasky

Demirkale, S.Y. (2019, 12). *Gürültünün İnsan Üzerindeki Etkileri* (Effects of noise on human). http://www2.ormansu.gov.tr/osb/Files/duyuru/anasayf aDuyurular /Sunu%205%20Prof.Dr.Sevtap%20Y%C4%B1lmaz% 20Demirkale.pdf date: 11.12.2016.

Chmúrny, I. et al. (2013). *Fyzika vnútorného prostredia budov*. Bratislava: STU, s.160-163, ISBN 978-80-227-3917-7.

Kóša, M. (2017). *Hlučnosť pracovného prostredia v kovoobrábacej dielni a možnosti jej znižovania*. Bakalárska práca. Nitra: PF UKF.

Mohamed, OMA (2017). *Noise Induced Hearing loss among Employees at Alasaad Steel Factory, Khartoum State*. Sudan: University of Gezira; (Google Scholar). http://41.67.35.36/bitstream/handle/123456789/1088

Očkajová, A., et al. (2013). *Pracovné prostredie a ergonímia*. Banská Bystrica: UMB v BB, FPU, p. 402. ISBN 978 80-557-0617-7.

Sajin, S., Chin, C.S., & Neo, J. (2019). *Acoustics vs. psychoacoustics: An objective and subjective analysis of classroom acoustics in Singapore*, Noise Control Engineering Journal, *67* (2), pp. 80–97.

Smetana, C. (1974). *Měření hluku a chvění*, Praha: Státní nakladatelství technické literatury, p. 210.

Vas et al. (2005). *Forgácsol muhely zaj szintvizsgálata*. (n.d.). https://dokutar.omikk.bme.hu

Veber, V. (1982). *Pracovní prostředí*. Práce, Praha, p. 324.

Vilcekova, S. et al. (2017). *Indoor environmental quality of classrooms and occupants' comfort in a special education school in Slovak Republic, Building and Environment,* p. 120, 29-40.

Vujica, Herzog, N., Buchmeister, B., & Spindler, L. (2020). *Assessment of School and Industrial Noise: Measurements vs Personal Perceptions*. DAAAM International Scientific Book.

Wang, P., Wang, Y., Zou, C., & Guo, J. (2017). *A preliminary investigation of noise impact within metro stations in the urban city of Guangzhou*, China, Environmental Science and Pollution Research, *24* (12), pp. 11371-11382.

Xie, H., Kang, J., & Tompsett, R. (2011). *The impacts of environmental noise on the academic achievements of secondary school in Greater London*, Applied Acoustics, *72* (8), pp. 551-555.

Support for Novice Teachers in Secondary Schools

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DOI: https://doi.org/10.53349/resource.2023.is1.a1195

Abstract

The article deals with the issue of in-service training and support for beginning teachers. It represents a project aimed at supporting novice secondary school teachers. It describes the outputs of the project and, above all, the main output of the project, which is an interactive support tool for beginning teachers - a web portal - created with the intention of supporting novice secondary school teachers when entering the professional educational environment.

Keywords: novice teacher, secondary school, interactive support, web portal

1 Introduction

A novice teacher is a university graduate who has decided to pursue his/her profession, a teacher without experience. A novice employee can be perceived as young, inexperienced, who has not yet mastered all work procedures, but he/she must be perceived above all as a prospective and promising employee. Beginning employee - this is the designation of a pedagogic or professional employee who is included in the career level novice pedagogic employee when starting the first employment relationship in which he/she will perform pedagogic activities or an employment relationship with another employer after the unsuccessful completion of the adaptation education of the pedagogic employee at the previous employer.

A novice pedagogic employee or a novice professional employee is obliged to complete and successfully complete adaptation training no later than two years after starting the first employment relationship in which he/she performs work (Act No. 138 on pedagogical employees and professional employees and on the amendment of certain laws).

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The discussion about the quality of training of future teachers has been held since the end of the 20th century. After the opening of new universities, teaching studies are offered by a number of different faculties, from pedagogic to more technically oriented. The content of the study programs is equally diverse. Until now, individual universities, sometimes even faculties within one university, determined the form, scope and order of the basic components of teacher training. There are differences between the faculties in the composition and implementation of the pedagogical-psychological component of teacher training and the hourly allocation of professional-didactic disciplines. The most striking differences are in the length of teaching practices (Nálepová, 2019).

Many authors who investigate the development of teacher professionalism agree that teachers go through several stages of professional development during their professional career (Dreyfus, 1987, Berliner, 2001, Messner - Reusser, 2000, Kasáčová, 2002, etc.). According to them, at each stage, the teacher is characterized by typical characteristics, but what is particularly important, also by a typical orientation to which he/she pays the main attention. Therefore, at each stage, he/she needs a different kind of support, education or advice. According to their findings, the beginner concentrates on his/her own activity in the sense of how best to "survive" teaching in his/her own classroom. At this stage, he/she is not yet able to devote himself/herself too deeply to considerations of the didactic transformation of the curriculum, nor to targeted interventions stimulating individual student development (Kosová, 2019).

In the following parts of the paper, we are devoted to the preparation of future secondary school teachers and to the project implemented by us, the main output of which is an interactive support tool for novice teachers - a web portal - created with the intention of supporting novice secondary school teachers when entering the profession.

2 Preparation of future secondary school teachers at DTI University

The main mission of DTI University is **to provide, organize and ensure university education in accredited study programs, carry out creative scientific research and provide further education** through a wide range of courses and educational activities. The university focuses on the production and dissemination of knowledge and innovations, primarily in the field of applied study programs and scientific disciplines, with an emphasis on the preparation of experts in demand on the labour market, with the aim of contributing to the building of a knowledge-based and sustainably competitive economy of Slovakia. For this purpose, it cooperates with domestic and foreign universities, the business sphere, the public sector and non-governmental organizations and participates in international projects.

DTI University prepares future secondary school teachers. Students can choose bachelor's study programs focused on teaching: Teaching practical training and Teaching practical

training in economic subjects. Subsequently, the master's study program Teaching economic subjects is focused on the educational skills of economy teachers. Considering the focus of the paper, we will focus more closely on the master's study program.

The study program Teaching economic subjects allows to expand and deepen the knowledge gained by studying at the bachelor's degree of university studies in the study programs Teaching practical training in economic subjects, Teaching practical training or in related study programs. In addition to knowledge from the disciplines of their professional specialization, graduates of the study program also gain knowledge from the theory of vocational education, pedagogical-psychological subjects, skills from field didactics of economic subjects, science methodology, pedagogical research, etc.

A graduate of the master's level of higher education in the field of study of teaching and pedagogical sciences is:

- qualified to work as a teacher of economic subjects at secondary vocational schools,
- qualified to practice the profession of a school methodologist for teaching groups of economic subjects as part of professional teaching,
- a specialized employee of the state administration, or methodology of professional institutions for the field of vocational education and training,
- capable of projecting, implementing and reflecting on teaching in the classroom, i.e., mastering teaching skills,
- capable of participating in the development of methodological materials for the teaching process and in designing the lifelong education of adults with a professional focus,
- able to use the knowledge gained from research and development methods in the didactics of his/her field,
- ready to study at postgraduate doctoral studies(PhD.),
- ready to permanently learn and improve professionally through further education.

(https://www.dti.sk/studium/3-ucitelstvo-ekonomickych-predmetov)

We care about the best possible inclusion of graduates - teachers in the work process and facilitating the work of novice teachers. In this context, we decided to solve a project, the results of which would be beneficial for novice secondary school teachers in Slovakia.

We agree with the presented opinions of authors dedicated to quality in education and teacher training (Depešová, Tureková, 2014, Tureková et al., 2022, Hašková et al., 2019, Berková et al., 2019, Hargaš, 2019, Matějka & Miština, 2022) and consider it important to constantly improve the training of future teachers and subsequently support novice teachers. Based on the above, we have prepared a project to support novice secondary school teachers. The proposed project is a reflection of the ongoing need for a better connection between higher education and the practice of beginning teachers. The creation of such interactive support will enable the monitoring of the conditions, needs and comments of beginning teachers, which will be able to be transferred to the undergraduate training of teacher students. The presented project is multidisciplinary and comprehensively solves the problems faced by novice secondary school teachers.

3 A project aimed at supporting beginning secondary school teachers

The main goal of the project is to create an interactive support tool for novice secondary school teachers in Slovakia. In order to achieve the main goal of the project, it will be necessary to fulfil the following sub-goals:

In the first year of the project, the goal is to search for and analyse current professional publications, websites and portals dealing with the issue of novice secondary school teachers. There will be analysed sources from Slovakia and abroad. The results of the analysis will be digitally available to novice secondary school teachers on the created portal.
Another sub-goal based on the results of the analysis will be the creation of a research tool for identifying the needs of novice teachers. The selected identified needs of teachers will form the content framework of the created support tool.

The goal in the second year of the project will be the creation of interactive support for novice teachers of upper secondary education. During the creation itself, we will take into account the results of analyses of literary sources, as well as available websites not only in Slovakia but also abroad. The creation of the interactive creation itself will also be supported by research, with which we will gain an overview of the most frequent needs of novice teachers. Based on the mentioned research, we will include the identified and analysed content elements in the structure of the created interactive support for beginning teachers.
From the mentioned outputs, we will present the results of analyses at international conferences and professional events with the subject matter, at workshops and seminars organized for novice teachers.

4 The most important results achieved during the solution of the project

In accordance with the set goals and schedule of the project, the research team implemented the planned activities. The researchers searched for and analysed contemporary professional publications, websites and portals dealing with the issue of novice secondary school teachers. Sources available in Slovakia and abroad were analysed. The results of the analysis will be digitally available to novice secondary school teachers on the portal, the creation of which is planned for September 2023. Based on the results of the analysis, the research team created a research tool to identify the needs of beginning teachers. The selected identified needs of teachers will form the content framework of the support tool, which will be in accordance with the planned goals created in 2023. The planned goals of the project related to the evaluated period have been fulfilled.

The research team achieved the following most important results in the evaluated period: monitoring of available data for beginning secondary school teachers, creation of a research tool, organization of the international scientific conference SCHOLA 2022, solution of a Master's thesis in the area of the mentioned issue and creation of an Interactive support tool for beginning teachers, which is the most significant output project solutions and its version will be refined in the course of 2023.

Monitoring of available data for beginning secondary school teachers

In the evaluated period, the research team implemented the monitoring of available data for beginning secondary school teachers. The team analysed domestic and foreign literature, web portals and relevant results of research and studies that served to create a research tool and implement applied research.

Research tool

The research team prepared and created a research tool for determining the educational needs of novice secondary school teachers.

The researchers prepared for the implementation and began to implement applied research to identify the needs of novice secondary school teachers. Members of the research team created research samples in the Slovak Republic and the Czech Republic. A database of selected secondary schools was created for the implementation of the research. In order to identify the needs of beginning teachers, secondary schools from several regions of Slovakia (Trenčín, Trnava, Bratislava, Nitra and Košice regions) and from the Czech Republic were selected.

With the created research tool, we focus primarily on the following aspects of the teachers' work:

mastering the curriculum of subjects, mastering the methodology of teaching subjects, processing written preparation, formulating the goals of the teaching process, preparing the School Education Program, activating students in class, establishing contacts with students, relationships with students, respecting students' learning styles, testing and evaluating students, effective use of teaching time, working with teaching aids, working with didactic technology, working with ICT, respecting the principle of adequacy, formulating questions, observing the teaching timetable, responding to unexpected developments in teaching, organizing pupils' independent work, solving disciplinary offences, choosing a suitable teaching method, choosing a suitable organizational form, using innovative methods and forms of teaching, explaining the curriculum, maintaining school documentation, respecting the individual educational needs of pupils, motivating pupils, creating a good climate in the teaching process, communicating with parents, working as a class teacher, working in a subject committee, self-reflection.

We are also interested in how they evaluate the preparation for the teaching profession during university studies, what they consider the most complicated for novice teachers when starting work, and what, according to the respondents' opinions, would make the work of novice teachers easier.

International scientific conference SCHOLA 2022

We prepared the international scientific conference SCHOLA 2022. At the conference, information was presented in connection with the implementation of the project.

Master's thesis solution

In accordance with the topic of the project, a Master's thesis entitled "Determining the needs of novice teachers of vocational subjects at secondary schools" is being solved.

An interactive support tool for beginning teachers

The intention is to create interactive support for novice teachers of upper secondary education who enter the profession with individual needs for pedagogical development. Interactive support consists of a web portal under the authority of DTI University. The interactive nature of the support is in the sense of constant updating of the scope and content of the created support. However, the portal will be available and open to all novice secondary school teachers, where they will have the opportunity to ask questions, share experiences of good practice and discuss and consult with advisers in the field of didactics. The created interactive support will be communicated to DTI University students in the field of study Teaching and Pedagogical Sciences (study programs Teaching practical training, Teaching practical training in economic subjects, Teaching economic subjects), who represent the future target group that will use the needs of the created interactive support. After completing their studies, they will be able to find help and support in putting them into practice.
Interactive support - a web portal - has been created and according to the project schedule, it will be gradually completed as the solvers planned. The web portal is shown in Figure 1.

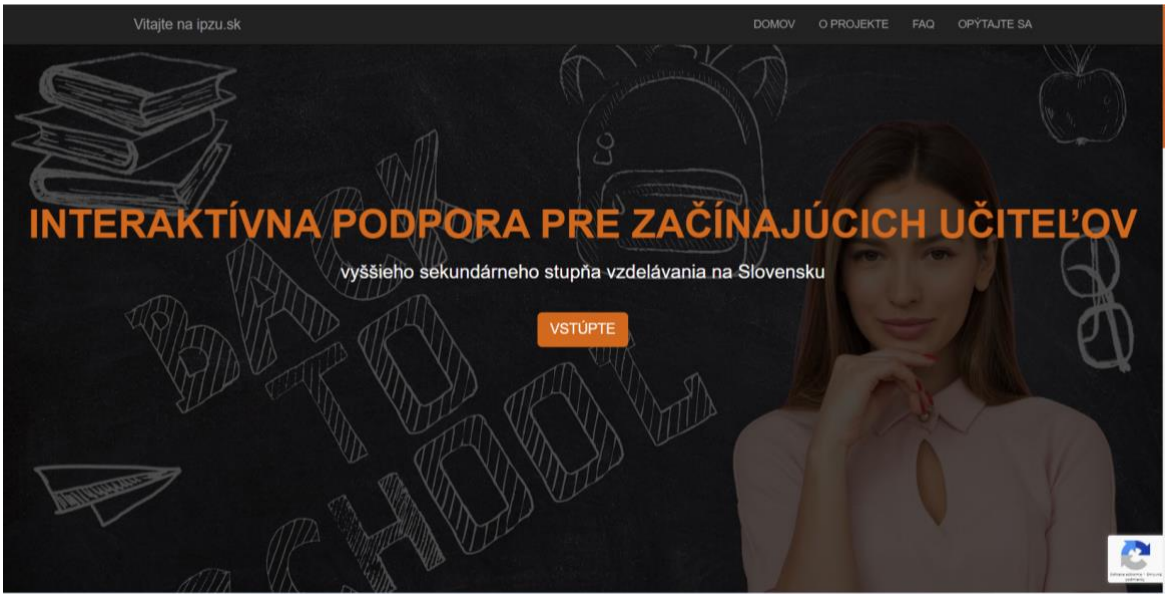

Figure 1: Web portal - an interactive support tool for beginning teachers.

Description, analysis and evaluation of the current state of professional publications, websites and portals for novice teachers will be made available digitally on the created portal.

Furthermore, based on the identification and analysis of the needs of novice teachers in secondary schools, the identified elements will be included in the content of the created interactive support tool.
The actual availability of the created support tool will be preceded by an assessment of its proposed structure, content and functionality.
The members of the research team will prepare and implement a webinar for students finishing their undergraduate training, for novice teachers from educational practice, for introductory teachers and for secondary school principals in order to present the results of applied research and the created interactive support with the aim of familiarization, subsequent commenting on the mentioned materials and subsequent coordination of proposals of the research team with colleagues in practice.
The interactive nature of the support is in the sense of constant updating of the scope and content of the created support. However, the portal will be available and open to all novice secondary school teachers, where they will have the opportunity to ask questions, share experiences of good practice and discuss and consult with advisers in the field of didactics.

5 Conclusion

We consider the preparation of secondary school teachers and the support of novice teachers to be very important. At DTI University, we train future secondary school teachers. At the same time, we decided to support novice teachers by creating interactive support for novice secondary school teachers who enter the profession with individual needs for pedagogical development. Interactive support consists of a web portal under the authority of DTI University. The interactive nature of the support is in the sense of constant updating of the scope and content of the created support. The portal will be available and open to all novice secondary school teachers, where they will have the opportunity to ask questions, share experiences of good practice and discuss and consult with advisors in the field of didactics. The created interactive support will be communicated to DTI University students in the field of study Teaching and Pedagogical Sciences, who represent the future target group that will use the needs of the created interactive support. After completing their studies, they will be able to find help and support in putting them into practice.

The authors gratefully acknowledge the contribution of the KEGA Grant Agency of the Slovak Republic under the KEGA Project 002VŠDTI-4/2022 „Creation of an interactive support tool for beginning teachers of upper secondary education in Slovakia “.

References

Berková, K., Krpálek, P., Krpálková Krelová, K. (2019). Future economic professionals: development of practical skills and competencies in higher education from the point of view of international employers. Economic Annals-XXI. 176 (3-4), pp. 91-98. ISSN 1728-6220.

Depešová, J., Tureková, I. (2014). Implementation model of teaching practice with the application of a videoconference system. *2014 IEEE 12th International Conference on Emerging eLearning*

Technologies and Applications (ICETA), Starý Smokovec, Slovakia. pp. 91-96. ISBN 978-147997740-6.

Hargaš, J. (2019). Dual education in terms of vocational and practical teaching. In : *R&E-Source*. Baden : Pädagogische Hochschule NÖ. ISSN (online) 2313-1640. Nr. 17, pp. 141-145 [online]

Hašková, A., Lukáčová, D., Noga, H. (2019). Teacher's self-assessment as a part of quality management. *Science for Education Today*. 9 (2), pp. 156-169. ISSN 2658-6762.

Kosová, B. (2019). Cesta začínajúcich učiteľov k profesionalite a ich zapojenie do reformných zmien na Slovensku. In : *Začínajíci učitel*. pp. 18-28. ISBN 978-80-7578-012-6.

Matějka, M. & Miština, J. (2022). Issues related to the profession of teacher and building professional life. *In: Research studies and theoretical analysis of the researchers from Slovakia, Czech Republic and Poland Warsaw, Collegium Humanum. p. 62-70.*

Nálepová, J. (2019). Je budoucí učitel dobře připravován na svoji profesi? In : *Začínajíci učitel*. pp. 14-17. ISBN 978-80-7578-012-6.

Project KEGA 002VŠDTI-4/2022. Creation of an interactive support tool for beginning teachers of upper secondary education in Slovakia.

Tureková, I., Hrmo, R., Marková, I., Kordosova, M. (2021). Evaluation of Acquired Knowledge about Occupational Safety in Dual Education. In : *TEM Journal* : Technology, Education, Management, Informatics. Novi Pazar : Association for Information Communication Technology Education and Science. ISSN 2217-8309. ISSN (online) 2217-8333. 10 (4), pp. 1775-1780. DOI 10.18421/TEM104-39.

Tureková, I., Marková, I., Hrmo, R., Harangozó, J. (2022). Dual Education and Occupational Safety Training. In: *R&E-Source*. Baden : Pädagogische Hochschule NÖ. ISSN (online) 2313-1640. Nr. 24 (2022), pp. 94-101 [online]. DOI 10.53349/resource.2022.iS24.a1114.

Zákon č. 138 o pedagogických zamestnancoch a odborných zamestnancoch a o zmene a doplnení niektorých zákonov.

Evaluation of Student Feedback as a Tool for Higher Education Quality Enhancement

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DOI: https://doi.org/10.53349/resource.2023.is1.a1196

Abstract

Student feedback is crucial for a thorough and meaningful university course evaluation process. It should be essential for a teacher´s reflection about teaching and learning in their courses. An efficient system of student feedback evaluation should not only collect feedback from students but also encourage teachers to use the feedback to improve their teaching practice to improve student learning. The article describes a new student feedback form and a system of follow-up conversations about the survey results between teachers and students developed and piloted at the Faculty of National Economy, University of Economics in Bratislava, in the academic year 2021/2022. It also presents the main results of using the conversations in the newly piloted system, based on interviews with participating teachers and students and thematic analysis of their verbatim transcripts.

Keywords: Student feedback, Course evaluation, Student feedback form, Feedback evaluation system, Follow-up student-teacher conversations

1 Introduction

Higher education institutions should focus mainly on teaching and learning processes in the courses they offer to their students and their interrelation with relevant recent research results. In their struggle for continuous educational development – thriving to function as effectively as possible as teaching and learning communities (Felten et al., 2007), they should analyse these processes regularly to find clues for teaching and learning innovations and overall quality enhancement. Students as the target audience of most higher education activities, and their feedback should therefore be at the centre of their attention.

At the Faculty of National Economy, University of Economics in Bratislava (FNE UEB), we have developed *a new system of student feedback evaluations* which should help to enhance the quality of teaching and learning continuously – within an Erasmus+ project "Designing holistic and sustainable educational development to improve student learning ". In January

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2022, we piloted the new system, which shifted its focus from students´ satisfaction with their teachers to how they perceive various elements that influence student learning in the courses they take (Novák, 2022a). We also piloted a new way of processing and dealing with the data from the student feedback forms – they were primarily used by members of the student parliament at the faculty who were asked to analyse them and come up with suggestions for improvements in the analysed courses. Student representatives then directly discussed the main findings and suggestions with the teachers willing to participate in the piloted system. We chose this approach because conversations about teaching and learning seem to be decisive in influencing the culture of teaching and learning in higher education towards the continuous development of teachers (Roxå, Mårtensson, 2015). Pleschová et al. (2021) conclude that five conditions make conversations about teaching and learning transform teachers´ conceptions and practice: cross-disciplinary participation, trustful relationships, conducive spaces, caring attitudes, and co-construction practices. The more these conditions are met, the greater the chance for a meaningful change in teaching. Even though these authors focus mainly on pedagogical conversations between teachers, we assume that conversations with their students about teaching and learning in their courses can also bring many valuable ideas. In this article, we first describe the new student feedback form's main features and the process of follow-up conversations between volunteer teachers and student representatives. Then we analyse the participants' experience in the piloted process and draw some conclusions and recommendations for further development of the proposed system.

2 Student Feedback in Use

Most authors agree that student feedback is crucial for quality enhancement in higher education. However, what student feedback means and how it should be used is not apparent. In this article, we have narrowed our focus only to the student feedback gathered officially in surveys organised by faculties, colleges, or universities, typically close to the end of each semester. Several different common terms are used in this context, such as student ratings, student evaluations of teaching, course evaluations and the like. There are also more purposes for which the survey results are used – from managerial and personnel decisions of faculty and university management to finding ways in how teaching can support learning more effectively and efficiently. Linse (2017) argues that student feedback forms gather students' views about their experience in each course. Therefore, the survey results should be considered student perception data, not faculty staff evaluations. They are also not measures of student learning, as many studies showed that there is usually "a low to moderate positive correlation between students´ ratings and their grades" (Linse, 2017, pp 41). This was also proved by a meta-analysis of teaching effectiveness by Uttl, White and Gonzalez (2017), who concluded that students in their research did not learn more from professors with higher student ratings. Even though some studies based on small-size samples showed significant or

moderate correlation, extensive sample-sized studies showed no or very little correlation between student ratings and student learning.

Universities should therefore be cautious when they use data from student feedback forms to evaluate teachers. They should also be aware that student ratings do not automatically drive improvement in pedagogical practices. Although they provide a tremendous amount of beneficial information in this respect, the cultural environment must encourage teachers to work with this information and use it thoughtfully and meaningfully when organising the same courses in the future. This seems a problem, as people tend to be reluctant to change their routines. Creating a culture based on continuous improvement in higher education is even more challenging.

Mårtensson, Roxå and Olsson (2011, p. 51) claim that university teaching appears "peculiarly resilient to all sorts of reform efforts made by managers and politicians". It is, therefore, important that the driving force for change should be the teachers themselves. Without that, any measures the faculty or university management takes are doomed to failure.

Nasser and Fresko (2002) explored teachers´ perceptions of the course evaluation system. Although overall attitudes towards it were mildly positive, only a few teachers reported changing their instruction based on student ratings. Darwin (2017) adds that although student ratings are supposed to help enhance the quality of teaching and learning, with the rise of market-based models in higher education, the purpose of ratings-based student evaluation has become increasingly confusing. It is caused mainly by the tension between improvement and accountability motives and by the fact that in many universities, student ratings are considered a proxy for teaching quality, making teachers less willing to consider the student voice, especially their critical comments. Blair and Noel (2014) support this conclusion with their research results showing very little evidence that student feedback evaluations led to any real significant changes in teaching practice in examined university courses. One of the reasons might be that student feedback forms used in the process may not measure the right things for this purpose. If universities measure students´ satisfaction as a proxy for teaching quality, the results may subvert the potentially conflicting objective of student learning (Bedggood & Donovan, 2011). However, the authors argue that "student learning can be measured and used to provide formative feedback for improving teaching effectiveness. Alternatively, student satisfaction can be appropriate for determining whether students are 'enjoying' their studies, and likewise offers distinct benefits to university managers measuring performance outcomes" (Bedggood & Donovan, 2011).

Lutovac et al. (2017) examined another pervasive obstacle to using student feedback meaningfully by teachers. They analysed university teachers´ emotional responses to student feedback and identified upward and downward emotional spirals regarding student feedback. They argue that pedagogical training seemed helpful in this respect as it provided participating teachers practical guidance for coping with student feedback. Similarly, the results of an earlier study (Murray, 1997) support this conclusion as they showed that student evaluation contributed significantly to the improvement of certain aspects of university teaching if it was

supplemented by expert consultation. This seems to be supported by other studies as well. Morgan, Sneed, and Swinney (2003) compared the views of university teachers and administrators about the validity of student ratings. They found that administrators believe student evaluations measure teaching effectiveness more than faculty. In contrast, teachers believe their personality is the primary determinant of ratings on student evaluations, followed by other factors such as the type of course, the workload of a course, and the grade distribution of a course. The study by Braga, Paccagnella, and Pellizzari (2014) helps identify some possible explanations for this situation. They found that teacher effectiveness was negatively correlated with students´ evaluations of teachers. Their results seem more consistent with the idea that students evaluate teachers based on their enjoyment of the course rather than their observation of the quality of teaching in the course.

Stroebe (2016) analyses the possible impact that student feedback forms focusing on students´ satisfaction may have – grading leniency: "Because many instructors believe that the average student prefers courses that are entertaining, require little work, and result in high grades, they feel under pressure to conform to those expectations". They present evidence that the positive correlation between students´ evaluation of teaching and their grades reflects a bias rather than teaching effectiveness.

There seem to be many biases influencing the results of student feedback evaluation, but the main problem seems to rest in two aspects:

a) the purpose for which the student feedback is collected, which influences the choice of the questions in the student feedback form,
b) the way how the survey results are dealt with.

Two approaches seem helpful if we want to use the system of student feedback evaluations primarily for higher education quality enhancement. The Course Experience Questionnaire (CEQ) by Ramsden (1991) is one of the first examples of student feedback forms constructed to measure how students perceive the most important aspects of teaching and learning in a particular course. The questionnaire focuses not on how they feel about the course and the teacher, whether they are satisfied with them or not, but on the features of teaching and learning that educational research attributes to good practice leading to a deep approach to learning. However, even this type of questionnaire might be misused if the survey results are not dealt with properly. Roxå et al. (2022) contend that "student ratings can only become a tool for enhancement when they feed reflective conversations about improving the learning process and when the scholarship informs these conversations of teaching and learning".

3 The Newly-piloted System of Student Feedback Evaluations at FNE UEB

3.1 Brief Description of the New Student Feedback Form and the Process of Follow-up Student-teacher Conversations

The student feedback form we created at UEB as part of the intellectual outputs of the project "Designing holistic and sustainable educational development to improve student learning" was supposed to become the basis of the second pillar of a new holistic system of educational development, whose framework was described in previous studies (e.g, Novák, 2022a). It was a reaction to some of the main results of a needs analysis we had carried out. Based on the survey results, we decided to construct it in such a way that it should help teachers facilitate student learning more effectively.

We were greatly inspired by the philosophy behind the CEQ (Ramsden, 1991) and the system that Lund University in Sweden had built based on that questionnaire (Roxå et al., 2022). As for the structure of the questionnaire, we used it at the University of Tartu, Estonia, in the academic year 2020/2021 as a basis for its framework.

The questions in the student feedback form we created were divided into five sections:

- The student´s participation in the course,
- The way of teaching in the lectures/seminars (How did the lectures/seminars support student learning?),
- The way of studying (How was student learning going on in the course?),
- The results of student learning and their assessment,
- The overall evaluation of the course (open-ended questions).

The first section was designed to map issues such as the respondent´s initial motivation to study, his/her actual active participation in lectures and/or seminars, his/her time for preparation during the semester as well as before the exam, and the final assessment of the student in the course.

The second section analysed how teachers facilitated student learning during lectures and/or seminars (separately). The main areas of concern were:

- learning outcomes,
- teaching and learning methods, organisation of the educational process,
- explanation of the subject matter,
- applicability of the subject matter in practice, how interesting it was for students,
- atmosphere and communication in and outside the class, feedback from the teacher,
- study materials.

A student feedback form which aims at helping teachers to facilitate student learning should also focus on how students did their learning during and after the semester. Therefore, the third section focused on these areas related to the results of learning in a university course:

- deep learning,
- active learning,
- creative thinking, problem-solving,
- ECTS versus students´ effort.

If the educational process is to be effective, it must have clear objectives and teaching methods and assessment methods aligned with the expected learning outcomes. The fourth section focuses on these aspects and analyses if the whole teaching and learning process in a course leads to students´ improvement and deeper understanding of the subject matter. It also asks about the comprehensibility of assessment criteria and whether the assessment in the course was perceived as objective.

The fifth section consists of open-ended questions where students can give their opinions about the suitability of the course for the study programme, which element of the course they appreciated most and what changes in the course they would suggest for the future.

After the data from the survey are collected and processed, the vital question needs to be solved: How shall we use the feedback if our goal is to enhance student learning? We believe it is vital that students and teachers collaborate and use the data to identify the critical areas and find ways of their improvement (Novák, 2022b). Conversations between teachers and students are a vital part of the system of student feedback evaluations. In our piloted system, we asked the members of the Student Parliament of FNE UEB as student representatives to analyse the information from the questionnaires to look for critical areas, sort out the comments in the open-ended questions (e. g., get rid of personal attacks, focus on the constructive comments), and come up with suggestions for changes helping to enhance learning in the courses analysed. Then we expected them to lead follow-up conversations with the teachers who volunteered to participate in the pilot activities after the winter semester of the academic year 2021/2022.

The aims of the follow-up student-teacher conversations were to:

- compare the students and the teacher´s points of view,
- discuss possible changes in the course from both points of view,
- agree on feasible changes that both students and teachers suppose should help to enhance student learning,
- summarise the results in a report to be made public to all the relevant stakeholders (e.g., present and future students in the course, faculty management, programme managers etc.) and binding for the course teachers in the next semester.

The pilot conversation after the winter semester of the academic year 2021/2022 was organised voluntarily for teachers. 13 out of almost a hundred teachers showed interest in trying this new system, and 8 pairs of students (all members of the Student Parliament)

prepared to have a conversation with these teachers about all the courses they had taught in the semester. After the conversation, the students were asked to prepare summaries of the main conclusions for each course discussed and send them to the respective teachers for comments before handing them to the faculty management.

3.2 Analysis of the Views of Participants in the Piloted New System

After the process ended, we analysed what the participating students and teachers thought about its pros and cons. In the interviews, we organised with five of the participating teachers and seven pairs of students we asked (Novák, 2022b):

- How meaningful was the conversation between you and the students/teacher about the course(s) of the winter semester?
- How useful was the conversation about improving the course for the future? Was it focused on a forward-looking process?
- How proper were the questionnaire survey and its results for your conversation with the students from the course/teacher of the course? Did it help you to identify the areas where the course should be improved?
- How useful was the analysis of the survey results that the students from the student parliament carried out for the conversation with the teacher?
- Do you think a) the questionnaire and b) the whole process with the conversation about the survey results was better or worse than the previous system of student feedback evaluations?
- Did you get any new ideas about possible improvements to teaching from the survey responses and/or the conversation?
- Would you recommend continuing with this new system? If so, would you suggest some changes that you find important (e.g., were there questions in the questionnaire that were unclear/without informative value, did you miss anything in the questionnaire, would you change anything in the process of follow-up conversations)?

To summarise the main findings, we can say that all the interviewed students and teachers thought this new system was better than the previous one, and they all recommended continuing with it in the future. However, a deeper analysis of the data showed that there was some space for improvements in this process. We used Braun and Clarke´s (2006) approach to thematic analysis with two different pairs of independent coders of the verbatim transcripts of the interviews with students and teachers.

Overall, all teachers thought the concept or the idea of the conversation between a teacher and students was (potentially) meaningful. However, from the experience itself (Curran & Davies, 2022):

- one of the interviewed teachers said, 'It was okay, 'the students were very nervous,
- another one said, 'It would be better if the students I spoke to had taken the course that was being discussed,
- another respondent revealed that the conversation was quite limited because the survey results were good.

Even more ideas for improvement of the whole process arose from the questions asking teachers about its usefulness. Some respondents saw several reasons the whole process was not as proper as possible. One respondent said they had not learnt anything new, but this was because they had already sought feedback from students and were responding to that in a separate process. Another one felt it was mainly through their reflections that they were coming up with ways to improve. The reason was that the conversation was carried out between them and members of the student parliament, who were not representatives of the course being discussed in this case. More than half of the teachers felt that the biggest problem in the piloted process was that the students had done a minimal analysis of the survey results before the conversations. However, they appreciated the chance to talk about the results with students. They also noticed the questionnaires were better – more oriented to student learning than in the past when the student feedback forms were mainly about teachers. Overall, the interviewed teachers would appreciate more ideas and suggestions from the students based on a more in-depth analysis of the survey results done by students in advance. To sum up, the pilot created opportunities for teachers´ self-reflection as well as for students to reflect on their learning experience, but there are some areas for consideration in the future (Curran & Davies, 2022):

- more careful selection of the most appropriate students to be part of the survey analysis and the conversations,
- more detailed analysis of the survey responses by the students,
- low return rate of the survey and the impact of this on subsequent conversations.

Interestingly, the interviews with the pairs of students revealed similar themes. Overall, the students were more passionate about the whole process and appreciated the attention given to student feedback. Some students admitted they could not find any suggestions for improvements explaining that the survey results for some courses were so good that there

was nothing to improve. It was interesting in this context that one of the interviewed students noted, 'There was just one question that had a bit worse rating, so there was nothing to improve in that course'. This proves that the student did not even realise that this was precisely the area they should focus on and try to help the teacher of the course with an explanation of the reasons for the worse rating in the area and suggestions for its improvement. Not only in this case, but some of the students also really appreciated how active some of the teachers were during the conversation – they were even surprised that some of the teachers came to the conversation already with their suggestions for improvements and were interested in what students thought about them. This aspect confirms that the teachers themselves more thoroughly thought through the analysis of the survey results than the students should have done. However, the interviews with the students revealed another problem that the students felt in connection with the pilot. They stressed that the conversations should be organised with more teachers, even those who did not volunteer. Teachers of the courses with bad ratings did not participate in the conversations. The students thought such conversations would be more valuable and helpful than conversations with teachers whose courses already had good ratings (Pasiar, 2022). Besides that, students appreciated the open-ended questions the most because they provided them with more direct clues and suggestions they could discuss with the teachers. This might be associated with the fact that they were not prepared well enough to analyse the survey results (the numerical ratings) and come up with their conclusions and suggestions.

4 Conclusion

Students and teachers who participated in the pilot appreciated the newly created system of student feedback evaluation at FNE UEB. They all recommended continuing with the new questionnaire and supported organising conversations about the results between students and teachers. However, students should be chosen for the conversation so that there was always a student who had taken the course as a part of the conversation about its results. The participating students should be trained better in advance to do the analysis and come up with solutions to the identified problems and suggestions for improvement. It would be more beneficial to have these conversations primarily with teachers of courses with worse results, where there is more space for changes that would lead to more substantial improvements and enhancement of student learning. It might also be a good idea to offer expert assistance to the teachers whose courses were evaluated poorly but who cannot suggest reasonable changes that might help with the identified problems.

Acknowledgements
This work was supported by a generous grant from the Erasmus+ Strategic Partnerships programme under grant number 2020-1-SK01-KA203-078299 "Designing holistic and sustainable educational development to improve student learning".

References

Bedggood, R. E., & Donovan, J. D. (2012). University performance evaluations: What are we really measuring? *Studies in Higher Education*, *37* (7), p. 825 – 842. https://doi.org/fwxqbq

Blair, E., & Noel, K. V. (2014). Improving higher education practice through student evaluation systems: is the student voice being heard? *Assessment & Evaluation in Higher Education*, *39* (7), p. 879 – 894. https://doi.org/gcph3j

Braga, M., Paccagnella, M., & Pellizzari, M. (2014). Evaluating students' evaluations of professors. *Economics of Education Review*, *41*, p. 71 – 88. https://doi.org/f6fvrw

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3* (2), p. 77 – 101. https://doi.org/fswdcx

Curran, R., & Davies, V. (2022). Improving university courses to enhance student learning through conversations about student feedback: the newly piloted system at University of Economics in Bratislava: conference presentation. *Making student feedback count in improving pedagogical practice (15 September 2022)*. Tartu: University of Tartu.

Darwin, S. (2017). What contemporary work are student ratings actually doing in higher education? *Studies in Educational Evaluation*, 54, p. 13 – 21. https://doi.org/ghjbps

Felten, P., Kalish, A., Pingree, A., & Plank, K. (2007). Toward a scholarship of teaching and learning in educational development. In D. R. Robertson & L. D. Nilson (Eds.), *To Improve the Academy: Resources for Faculty, Instructional and Organizational Development, 25*. San Francisco, CA: Jossey-Bass (p. 93–108).

Linse, A. R. (2017). Interpreting and using student ratings data: guidance for faculty serving as administrators and on evaluation committees. *Studies in Educational Evaluation*, *54*, p. 94 – 106. https://doi.org/gfc3wx

Lutovac, S., Kaasila, R., Komulainen, J., & Maikkola, M. (2017). University lecturers' emotional responses to and coping with student feedback: a Finnish case study. *European Journal of Psychology of Education, 32* (2), p. 235 – 250. https://doi.org/gpqwx8

Mårtensson, K., Roxå, T., & Olsson, T. (2011). Developing a quality culture through the Scholarship of Teaching and Learning. *Higher Education Research & Development*, *30* (1), p. 51 – 62, https://doi.org/bwg7hd

Morgan, D. A., Sneed, J., & Swinney, L. (2003). Are student evaluations a valid measure of teaching effectiveness: perceptions of accounting faculty members and administrators. *Management Research News*, *26*, p. 17 – 32. https://doi.org/ccxfcq

Murray, H. G. (1997). Does evaluation of teaching lead to improvement of teaching? *International Journal for Academic Development*, *2* (1), p. 8 – 23. https://doi.org/bdr3mg

Nasser, F., & Fresko, B. (2002). Faculty views of student evaluation of college teaching. *Assessment & Evaluation in Higher Education*, *27* (2), p. 187 – 198. https://doi.org/dxqxtp

Novák, J. (2022a). Designing Holistic and Sustainable Educational Development: A Case Study of University of Economics in Bratislava. *R&E-SOURCE: Online Journal for Research and Education*. *9* (24: Special Edition: Factory of Engineering Pedagogy – FEP), p. 42 – 48. https://journal.ph-noe.ac.at

Novák, J. (2022b). Improving university courses to enhance student learning through conversations about student feedback: the newly piloted system at University of Economics in Bratislava (UEB): conference presentation. *Making student feedback count in improving pedagogical practice (15 September 2022)*. Tartu: University of Tartu.

Pasiar, L. (2022). Interviews with students: Thematic analysis of students´ opinions: conference presentation. *Making student feedback count in improving pedagogical practice (15 September 2022)*. Tartu: University of Tartu.

Pleschová, P., Roxå, T., Thomson, K. E., & Felten, P. (2021). Conversations that make meaningful change in teaching, teachers, and academic development. *International Journal for Academic Development*, *26* (3), p. 201–209, https://doi.org/gmq9tr

Ramsden, P. (1991). A performance indicator of teaching quality in higher education: the Course Experience Questionnaire. *Studies in Higher Education*, *16* (2), p. 129 – 150. https://doi.org/bxbszr

Roxå, T., Ahmad, A., Barrington, J., Van Maaren, J., & Cassidy, R. (2022). Reconceptualizing student ratings of teaching to support quality discourse on student learning: a systems perspective. *Higher Education*, *83* (1), p. 35 – 55. https://doi.org/gjpm7f

Roxå, T., & Mårtensson, K. (2015). Microcultures and informal learning: a heuristic guiding analysis of conditions for informal learning in local higher education workplaces. *International Journal for Academic Development*, *20* (2), p. 193 – 205. https://doi.org/f3p62h

Stroebe, W. (2016). Why good teaching evaluations may reward bad teaching: on grade inflation and other unintended consequences of student evaluations. *Perspectives on Psychological Science*, *11* (6), p. 800 – 816. https://doi.org/gfxf38.

Uttl, B., White, C. A., & Gonzalez, D. W. (2017). Meta-analysis of faculty's teaching effectiveness: student evaluation of teaching ratings and student learning are not related. *Studies in Educational Evaluation*, *54*, p. 22 – 42. https://doi.org/gc3hsn

Impact of Four Coronavirus Waves on Higher Education: Comparative study

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DOI: https://doi.org/10.53349/resource.2023.is1.a1197

Abstract

The comparative study focuses on the comparison of education during the corona crisis at the Constantine the Philosopher University in Nitra (UKF). Specifically, it will compare the four waves of the coronavirus and their impact on students of the UKF Faculty of Education in Nitra from the point of view of education. It also focuses on the development and sustainability of education at the faculty. The research was carried out using the questionnaire method after each semester during the two years of the pandemic. The research was attended by 523 respondents who studied at the Faculty of Education of Constantine the Philosopher University in Nitra.

Keywords: Educational research, Education, Corona crisis, Comparative study

1 Introduction

The year 2020 was clearly a stressful year for almost all areas of daily life, not excluding education. While the area of the full-time school education system, primary, secondary and higher education, is in the media spotlight almost daily, the vast area of other education has remained largely unnoticed. The fact is that we found ourselves in a new, specific situation that we were not prepared for. The actions to combat the pandemic, consisting of the restriction of mobility, which went hand in hand with the restriction of face-to-face actions, significantly limited educational activity in this area and in most cases made it completely impossible. As far as it was possible, school education switched to another form (e-learning, distance learning, etc.), but this option was not always possible for material reasons. The introduction of online teaching was a challenge not only for schools and teachers but also for students. It was necessary to ensure contact between teachers and students, access to

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information and also provide flexible professional support for teachers. Despite the fact that no computer screen can replace personal contact with a teacher, digital education during the pandemic made it possible to move to other new forms of education, making extensive use of information and communication technologies, which also contributed to the acceleration of the digital transformation of education. It can be stated that there are several distance learning platforms that are available to the common population. For the University of Constantine the Philosopher in Nitra two platforms were strictly binding. The first platform was the EDU Educational Portal and the video conference system Meet.UKF. A big problem was the lack of technical equipment. For this reason, individual teachers were looking for ways to be in contact with students and provide them with at least basic support.

According to Marina Stock McIsaac, distance education is education in which the student and teacher are separated by time and place. It is currently the fastest-growing form at the international level. Something that was once considered a particular form of education using non-traditional systems now is becoming an essential concept in mainstream education. In the traditional teaching model, teachers and students meet in the same place and at the same time. During the pandemic, however, the participants could not be in one place, so the possibility of a different place at the same time or a different place at a different time was used. Teaching in which participants meet at the same time, typically using communication services, on a common platform from different places, is also referred to as synchronous. This is, for example, a lecture that the teacher presents in real-time with the online participation of students. However, the teacher can also choose another way and can pre-record his lecture and provide this recording to the students. Then we talk about asynchronous distance learning. The situation marked by the Covid-19 pandemic caught the Ministry of Education of the Slovak Republic so, that online education platforms were not provided in the first months of distance education and digital technologies were primarily used for the purpose of communication and mediation of curriculum content between teaching staff, pupils and students at their place of residence. The time frame of the teaching units was flexible, parallel teaching took place according to needs and possibilities in the morning and afternoon hours, which caused increased demands on personal, technical, communication and time management and on the adaptation of individuals.

The aim of this paper is to examine distance education in the context of the pandemic, technologies, concepts and benefits as it becomes an essential part of education systems in both developed and developing countries. Thanks to new technologies, the ways of teaching and acquiring new knowledge are no longer limited by space and time. New technologies offer great flexibility in when, where and how to distribute teaching and learning and offer flexible learning opportunities for individuals and groups of learners. Distance learning is one of the fastest-growing areas of education and its potential impact on all education-providing systems has been greatly enhanced through the development of Internet-based information technology. In order to meet the needs of a changing world, future distance learning must be time-flexible, without geographical barriers, competitive and student-centred.

2 The Research Sample and Methodology

The research was carried out in the academic year 2019/2020 summer semester until the academic year 2021/2022 winter semester. In total, there are four semesters, which also represent four waves of the coronavirus. The entire research took place at the University of Konstantin the Philosopher in Nitra, specifically at the Faculty of Education.

The study was prepared based on the findings that emerged from four questionnaire surveys. All questionnaires were identical and contained 29 questions. The questionnaire initially focused on categorising respondents according to gender, year, type of study, faculty, and department.

The next part of the questionnaire focused on education during the corona crisis. This section contains 9 questions and is key to our comparative study.

The next section of the questionnaire dealt with technical equipment and experiences with online education. This section also contained 9 questions.

The last section focused on the environment in which teaching took place and its microclimatic conditions. There were 5 questions in this section.

The last two sections are not analysed in this post and will be covered in future posts. All questionnaires were processed using the same statistical methods, and then their results were compared and evaluated in a percentage display.

Besides the questionnaire, we also used the literary method of observation and interview to verify our goals.

523 university students (respondents) took part in the research over the course of four semesters. Of the 523 respondents, 19% were men (100), and 81% were women (423).

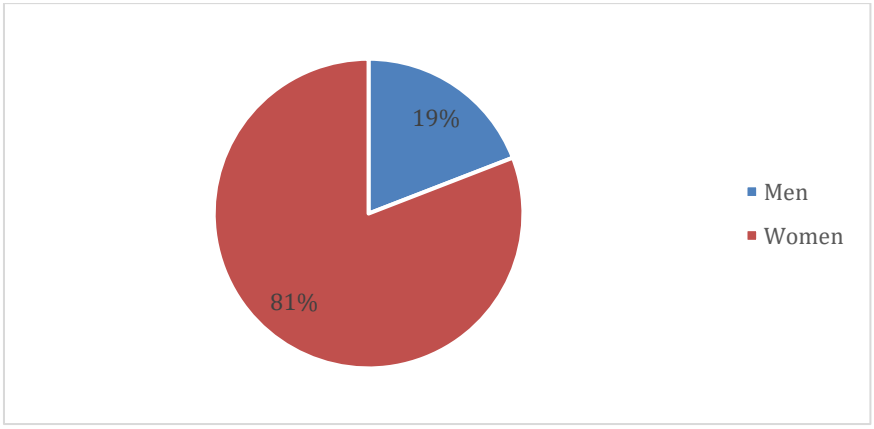

Fig. 1 Gender of the respondents

We were also interested in what form the respondents´ study. From the respondents' answers in the questionnaire, it follows that most respondents studied, up to 80%, in the full-time form of study. Only 20% of the respondents who filled out the questionnaire reviewed in an external study form.

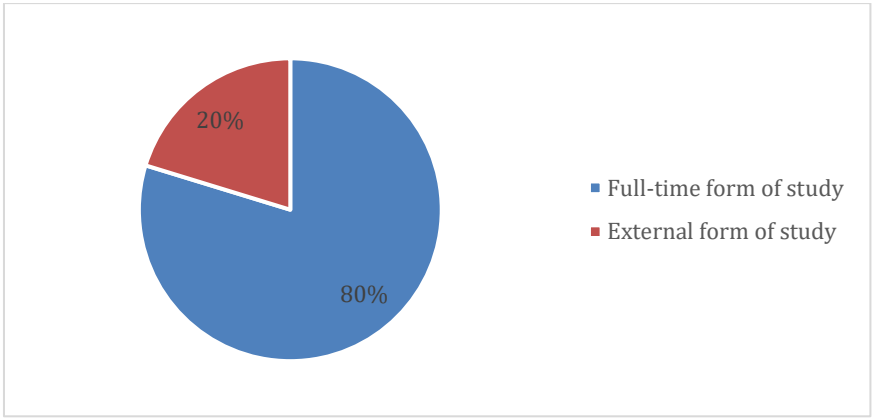

Fig. 2 Form of studies

We also investigated the representation of different years of study of students. According to the graph below, all study years, including PhD. and extension studies, were involved in the research. Most respondents were from the first year of bachelor's studies (38.2%), followed by respondents from the first year of master's studies (19.9%), the second year of bachelor's studies (18.5%), the third year of bachelor's studies (10.5%), the second year of master's studies (7.5%). Respondents from extension studies and respondents from the fourth year of bachelor's studies were 2.5%. The respondents of PhD studies had the smallest representation (0.4%).

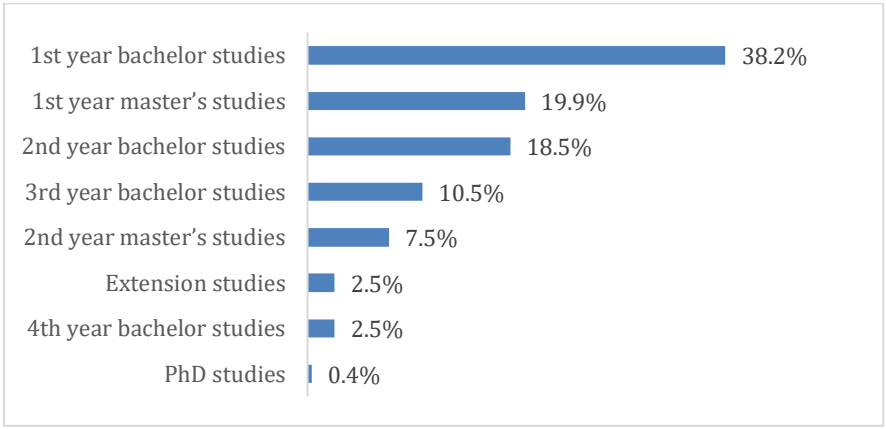

Fig. 3 Year of study

The last category we investigated is the affiliation of the respondents to a specific department. Respondents from all departments of the Faculty of Education of the University of Konstantin the Philosopher in Nitra participated in the research. The Department of pedagogy had the most significant representation at 56%, followed by the Department of Technics and Information Technologies at 22%. In third place was the Department of Language Didactics and Intercultural Studies with 10%. Other departments got a low percentage representation of 4% and less, more in the picture below. The lower representation of some departments is

caused by two factors. The first factor is the smaller number of students in the department compared to, for example, the Department of Pedagogy, and the second factor is the lack of interest in students' involvement in research by filling out a questionnaire.

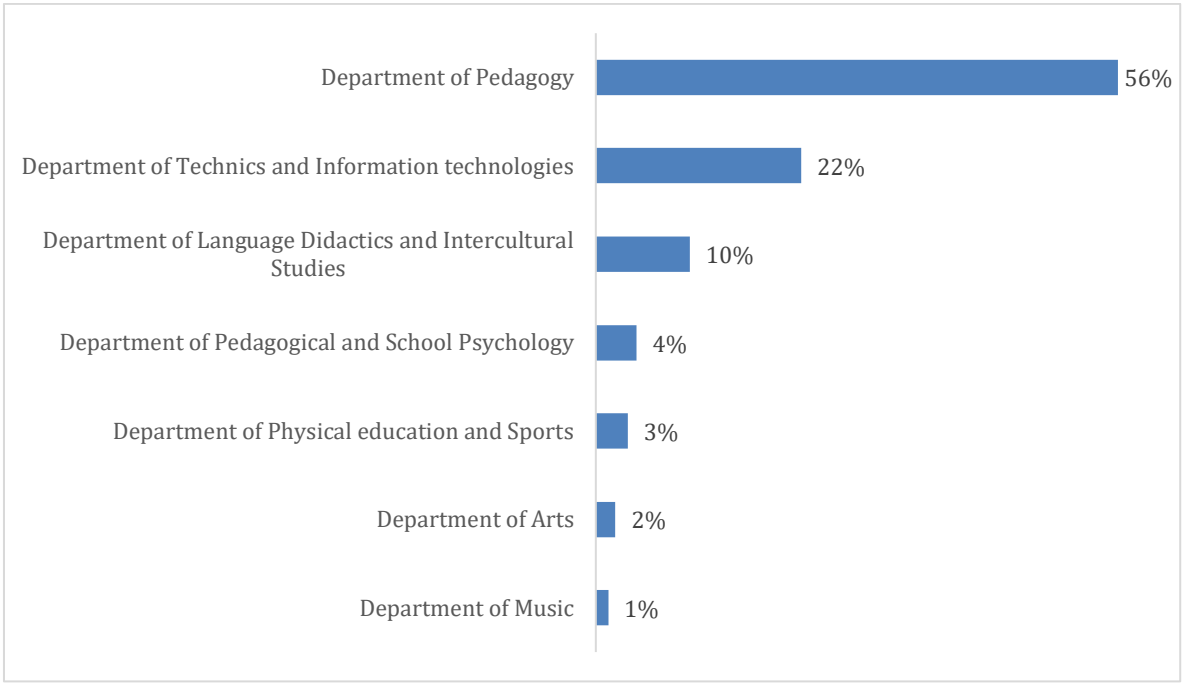

Fig. 4 The department of your studies

Based on the previous findings, we can conclude that all study years and all departments that educate students at the Faculty of Education are represented in the research. Due to the focus of the faculty, the respondents are predominantly women, and more than half of the respondents are from the Department of Pedagogy. The ratio of full-time and external forms of study is significantly in favour of full-time, from 80% to 20%. But in general, the representation of full-time students in regular education is also considerably higher. In terms of year of study, the first year of bachelor's studies has the highest representation. There are most of these students at the Faculty of Education, and therefore they have the highest representation in the research sample.

3 RESULTS

With the first question of the questionnaire, we were finding out how teaching, led by teachers, was conducted during the corona crisis. Respondents had a choice of 8 answers (the possibility of selecting multiple answers) plus the option to add another solution (figure 5).
During the first wave, the University of Constantine the Philosopher and the Faculty of Education were not ready for online education. Teaching, therefore, took place most often in

the form of assigning seminar papers (theoretical papers) (81%). Values above 40% were also exceeded by education through e-learning courses (46%), education through email (46%) and assignment of projects (practical work) (41%). Education through the video-conference system (32%) also achieved a relatively high percentage. Among the least used forms of education, with a value of 14%, was the form of education through social networks, followed by education through online consultation, with a value of 12% and the Microsoft Teams system was used the least, only 5%.

Both the university and the Faculty of Education were better prepared for the second wave, and the forms of education have also changed significantly. The most used form of education became video-conference systems (88%), which grew by 56% compared to the first wave. They were followed by the assignment of seminar papers (theoretical papers) (46%); these decreased by up to 35% compared to the first wave, and slightly more than 30% received education through e-learning courses (32%) and the assignment of projects (practical papers) (31%). Compared to the first wave, education via e-mail significantly worsened (decreased by 25%), which reached only 25%. On the contrary, education with the help of Microsoft Teams increased significantly, rising from 5% to 18%. Education through a social network and online consultation received 10%. Compared to the first wave, there was no significant decrease in these two forms of education.

The third wave was very similar to the second wave, and the forms of education reached similar values. Although education through video-conferencing systems decreased by 4% to 84% compared to the second wave, we do not consider this decrease to be statistically significant. On the contrary, the form of education in assigning seminar papers (theoretical papers) increased compared to the second wave by 18% to a value of 64%. A slight increase (15%) was recorded in education through the assignment of projects (practical work), which reached a value of 46% in the third wave. Education via email has stabilised at 30%, which is only 2% less than in the second wave. Forms of education through Microsoft Teams (increase by 5%), social networks (decrease by 3%), and online consultations achieved the same values as in the second wave (10%). A decrease of 11% compared to the second wave was recorded by e-mail education.

The fourth wave continues the trend of the previous two waves, and its values are very similar. Education through video-conferencing systems reached a value of 82%, which is only 2% less than in the third wave, and we do not consider this a statistically significant difference. Education in the form of assigning seminar papers (theoretical papers) decreased by 7% compared to the third wave but increased by 11% compared to the second wave. It settled at 57%. Compared to the second and third waves, the form of education through the assignment of projects (practical work) decreased and stabilised at 23%. The decrease compared to the third wave was up to 23% and compared to the second wave only by 8%. We explain this decrease by the fact that the teachers found a suitable ratio between the use of the video-conference system (82%) and the assignment of theoretical (57%) and practical papers (23%), a total of 80%. The discussed material that the pedagogues explained through the video-conference system, gave the students the task of working out with the help of seminar papers

or projects. For e-learning courses, there was a slight decrease of 7% compared to the third wave, and the resulting value of this form of education stabilised at 23%. Practically no change has occurred in education through Microsoft Teams. Compared to the third wave, there was a decrease of only 1% to the resulting 22%. Compared to the second wave, there was an increase of 4%. With this form of education, we can state that it achieves the same values in the long term. Education via email is very similar. This has stabilised at a value of 20%. This is an increase of 6% compared to the third wave and a decrease of 5% compared to the second wave. Online consultations and education through social networks have maintained values of around 10% since the first wave. In the fourth wave, education through social networks received 9% and online consultations 12%.

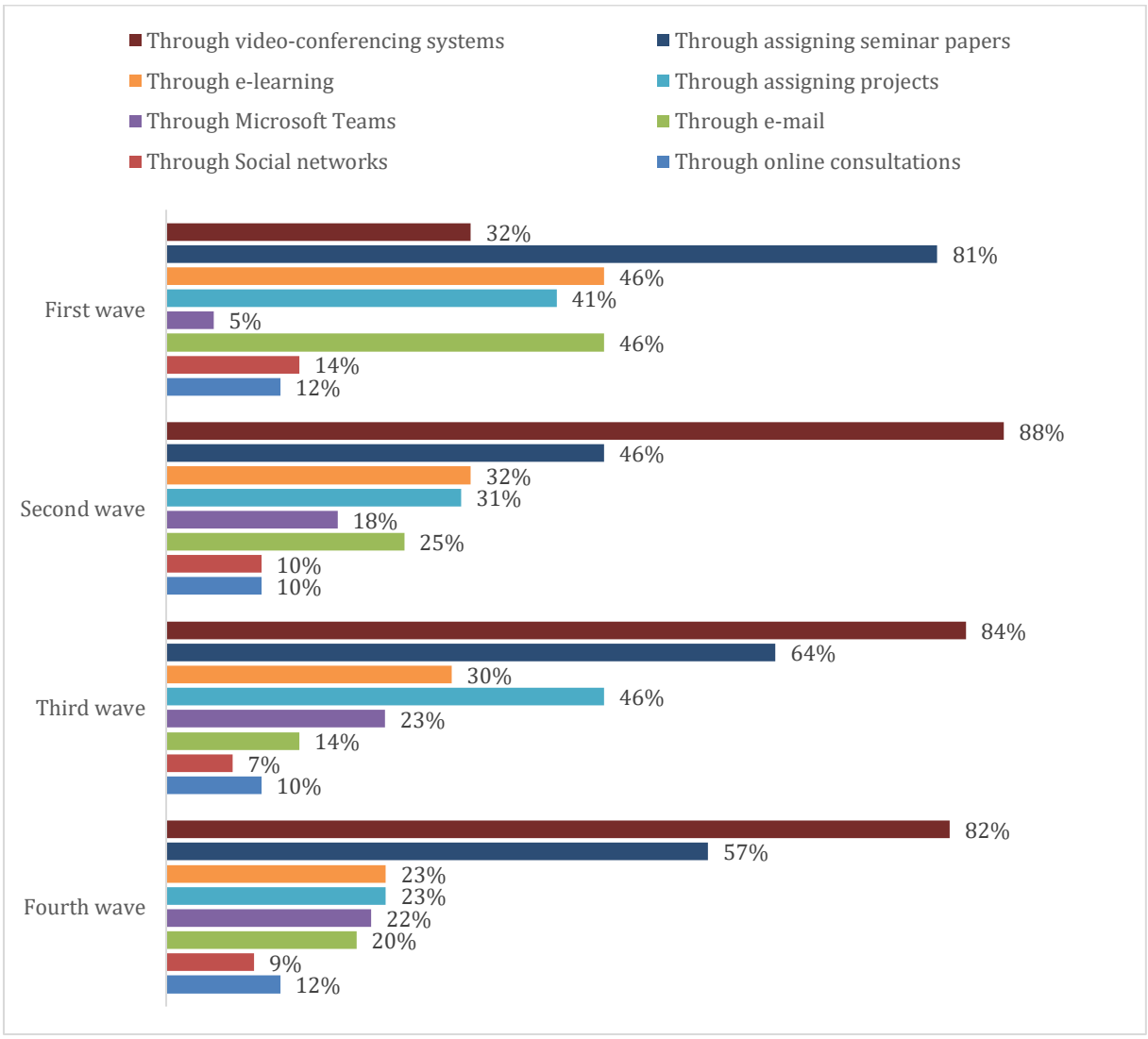

Fig. 5 Education process

Based on the analysis, we conclude that during the four waves of the pandemic, the most significant changes in the form of education occurred after the first wave. In the first wave, the Faculty of Education of the University of Constantine the Philosopher in Nitra needed to

be sufficiently prepared for distance education. During the next three waves, education at the Faculty of Pedagogy stabilised, thanks to deploying new technologies such as its own Meet. UKF video-conferencing system and Microsoft Teams team collaboration software. In the same way, pedagogues also went through training to work with new technologies and found their system for using these technologies effectively in education.

With the second question, we investigated the most frequently used video-conference systems at the Faculty of Education of the UKF in Nitra (figure 6).

In the first wave, teachers used various video-conferencing systems only when the university deployed its own Meet.UKF video-conferencing system, the teachers gradually started using this video-conferencing system. The deployment of the university video conference system was also reflected in the achieved results. The university video-conferencing system Meet.UKF received 75%, which is significantly more than other video-conferencing systems. Skype (22%) and Zoom (20%) were used considerably less. Values below 10% were obtained by Messenger (8%), Whatsapp (5%) and Microsoft Team only 3%.

In the second wave, Meet.UKF was dominantly used (100%). Compared to the first wave, its use increased by 20%. Educators got used to this video-conference system, and students also appreciated it. Its control is simple, clear and allows easy sharing of presentations and desktops. Since teachers and students liked Meet UKF, the usability of other video-conferencing systems decreased significantly. The second most used system was Microsoft Teams (16%). Its popularity increased by 13% due to teachers' training to work with this system. The use of the Zoom application decreased by 8% compared to the first wave to a final value of 12%. The most significant decline occurred with the Skype application, which fell by 18% to a final 4%. Messenger was used by only 1% of respondents in the second wave. Messenger decreased by 7% compared to the first wave. No one used Whatsapp in the second wave.

In the third wave, the use of video-conference systems began to stabilise. Just like in the second wave, Meet.UKF achieved 100%. The use of the Microsoft Teams program increased slightly (by 7%), reaching 23%. Zoom (3%), Messenger (2%) and Whatsapp (0%) have practically stopped being used. However, the use of Skype has grown surprisingly. Compared to the second wave, the use of the Skype application increased by 33% to the final 37%. The increase in Skype was caused by teachers' frequent use of this application at the Department of Pedagogy. At the department of pedagogy, the Meet.UKF video-conference system was sometimes unstable due to many students logged on simultaneously (around 150). This is also why some teachers chose the Skype application as an alternative.

As in the second and third waves, the Meet.UKF system was used by 100% of respondents in the fourth wave as well. Microsoft Teams decreased compared to the third wave by 11% to the resulting 12%. Zoom was only used in 2%, about the same as in the third wave. Usage of Skype dropped just by 1% after considering the performance of Meet. UKF's video conferencing system servers. Other applications were no longer used in the fourth wave.

After analyzing the use of video-conferencing systems during the four waves of the pandemic, we conclude that the most frequently used video-conferencing system was Meet.UKF. Its

simplicity of the user environment and possibilities of use in the educational process was appreciated by teachers and students. Skype became the second most used video-conferencing system. Its frequent use was the insufficient performance of the servers for Meet.UKF, which, however, was resolved during the pandemic. Microsoft Teams has been used throughout the pandemic as a supplemental learning tool, with usage ranging from 12% to 23% over the last three waves. In the first wave, the university and teachers were still looking for a suitable video-conferencing system, reflected in the inconsistent use of video-conferencing systems.

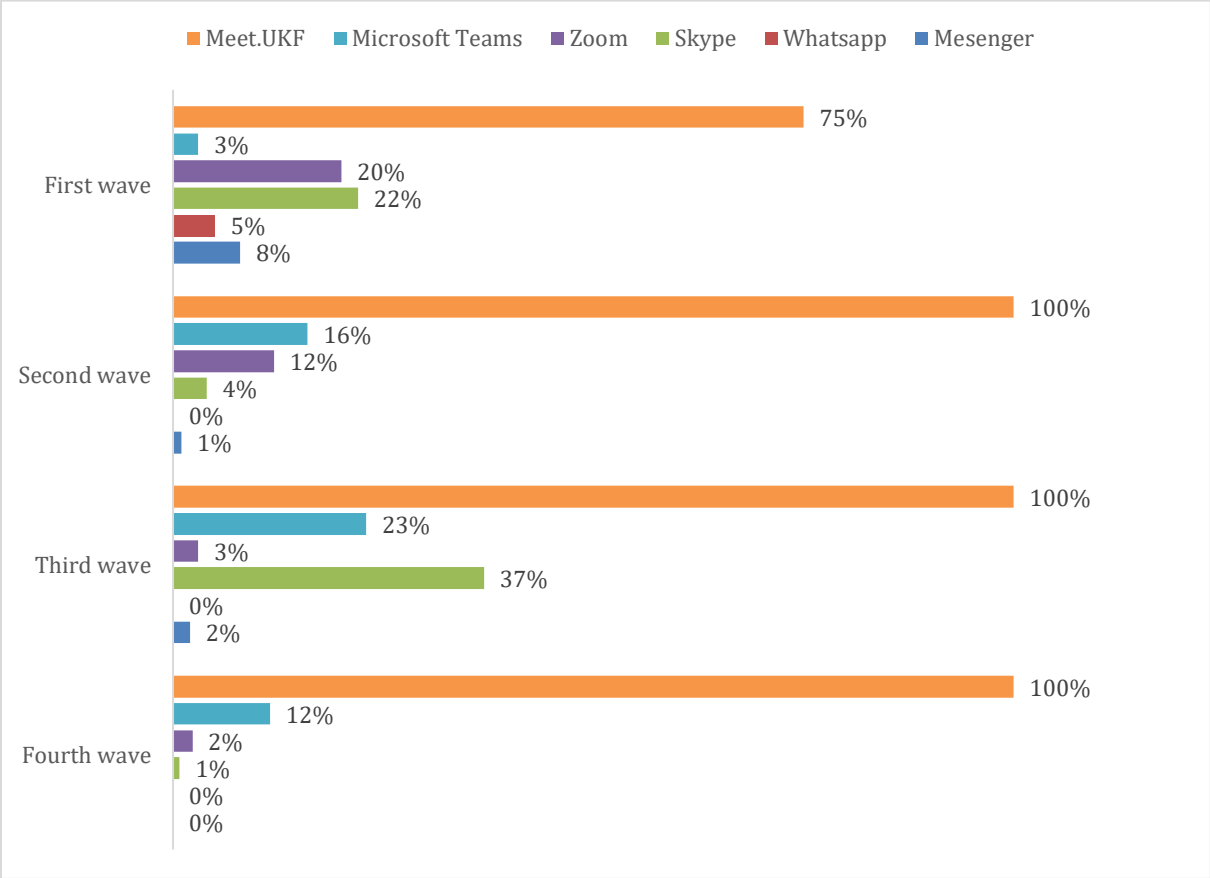

Fig. 6 Mainly used video-conference systems

As another question, we were finding out what were the most frequently used e-learning systems at the Faculty of Education (figure 7). For a long time, the university has been using and preferring its own UKF EDU e-learning system, which is built on the LMS Moodle. However, some educators also use other e-learning systems in the education process, such as Google Classroom, MS Teams, and so.

In the first wave, the dominant university education portal UKF EDU was used by 85% of respondents. LMS Moodle follows it with 10%. Since many respondents named UKF EDU's e-learning system as Moodle and vice versa, it is very likely that if they marked Moodle in the question, they actually meant UKF EDU. Therefore, this option to choose Moodle or UKF EDU

was purposefully included in the questionnaire. We assume that only a small percentage of respondents used a different LMS Moodle than the university one called UKF EDU. Another e-learning system used in the first wave was Google Classroom, which only gained 3%. Only 2% was acquired by Gmail. However, here we assume that the respondents meant Google Classroom; they just used the wrong terminology.

In the second wave, the use of UKF EDU increased by 8% to a total of 93%. Respondents stated that they used LMS Moodle in 6%. It follows that Moodle in the form of UKF EDU or its modification was used by 99% in the second wave. Only 0.5% of respondents said they used Microsoft Teams, and 0.5% said they did not use any e-learning system.

The third wave saw a negligible decrease in respondents' responses to the use of UKF EDU. This decreased by 4% to a total of 89%. Conversely, LMS Moodle rose by 2% to a final 8%. The university education system received 97%, which is a statistically insignificant difference compared to the second wave. Google Classroom and Gmail gained a combined 4%. In the third wave, other e-learning systems were not used at the Faculty of Education. The data obtained from the respondents indicate a trend of teachers focusing on using only the university e-learning system UKF EDU.

In the fourth wave, the situation with the use of e-learning systems stabilised, and the respondents stated that up to 97% used the UKF EDU e-learning system, and only 3% indicated LMS Moodle. No other e-learning systems were used.

During all four waves of the pandemic, the UKF EDU e-learning system was the most used. Gradually, all teaching staff got used to it, and in the fourth wave, they practically only used this e-learning system. This indicates the long-term sustainability of the use of this e-learning system in education.

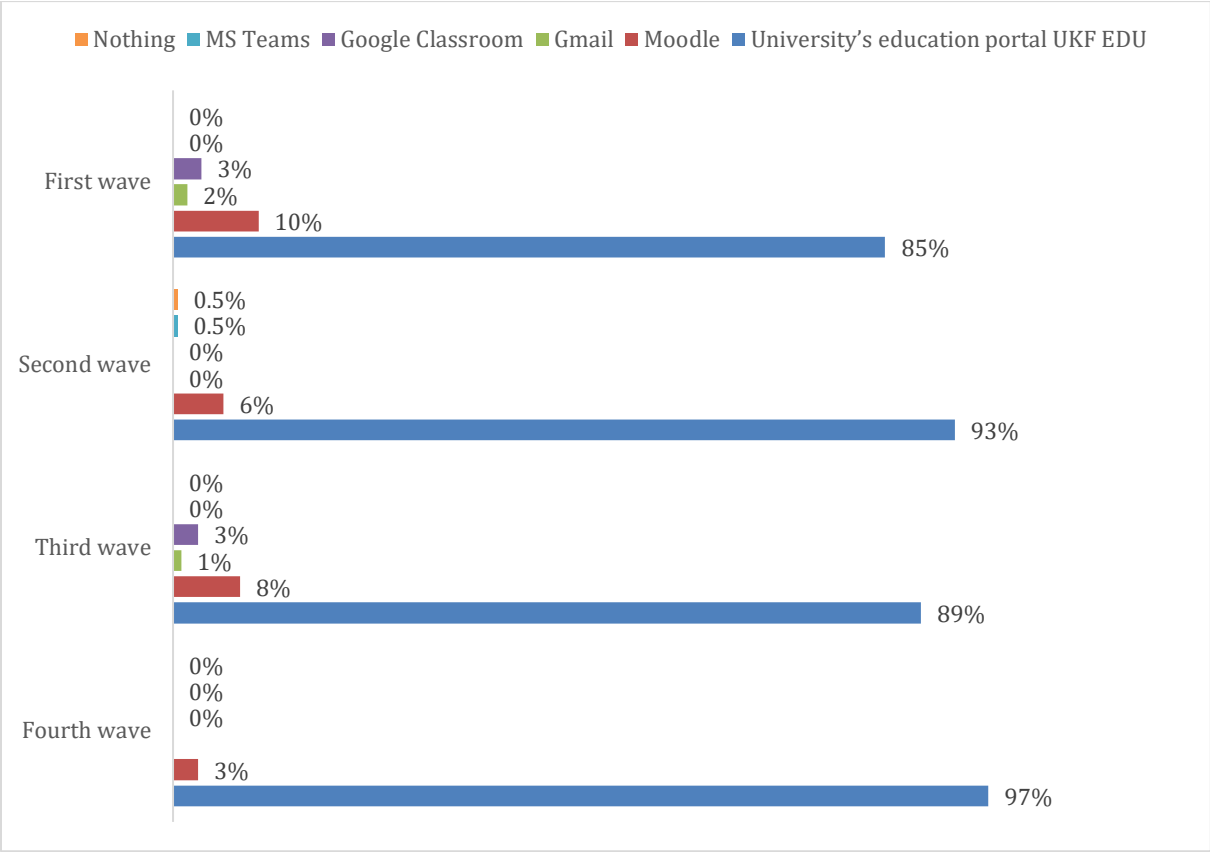

Fig. 7 Mainly used e-learning systems

The following question was used to determine the quality of the educational materials teachers at the Faculty of Education provided students during the pandemic (Figure 8).
In the first wave, the respondents stated that 2% of the materials were poor quality and 25% were average. Up to 53% of respondents considered the provided materials high quality. 20% of respondents chose the answer as very high-quality material. We note that 73% of the educational materials were of a high-quality level (the sum of high-quality and very high-quality materials).

In the second wave, the situation with the quality of educational materials was very similar to the first wave. There were only 2% of poor-quality materials. Average materials fell by 3% to a total of 22%. Similarly, high-quality materials fell by 3% to 50%. At the same time, however, very high-quality educational materials rose to 25%. In total, 75% of the educational materials were of high quality.

In the third wave, none of the respondents stated that the educational materials were of poor quality or very poor quality. Average educational materials reached 27%, 5% more than in the second wave. The number of high-quality educational materials also increased by 8% to 58% compared to the second wave. However, high-quality educational materials fell by up to 11% compared to the second wave. In total, however, quality educational materials received 72%.

In the fourth wave, the educational materials were evaluated very similarly to the previous waves. Very poor- quality materials gained 1%. Low-quality educational materials reached a value of 2%. The sum of these low-quality materials is only 3%, which is a very low value. The average educational materials' value decreased slightly (by 5%) to the final 22%. High-quality educational materials decreased by 3%, which is a statistically insignificant decrease to a total of 55%. Very high-quality materials, on the other hand, rose by 6% to a final 20%. In total, however, quality educational materials received 75%.

Based on the analysis, we conclude that students were provided with quality materials during all four waves of the pandemic. Respondents stated that, in total, three-fourths of the educational materials provided were of high quality. Slightly more than 20% of the educational materials were average during all waves of the pandemic, and only about 2% of the respondents included them in the group of low-quality materials. Based on these data, we conclude that UKF Faculty of Education in Nitra teachers provided quality educational materials throughout the pandemic.

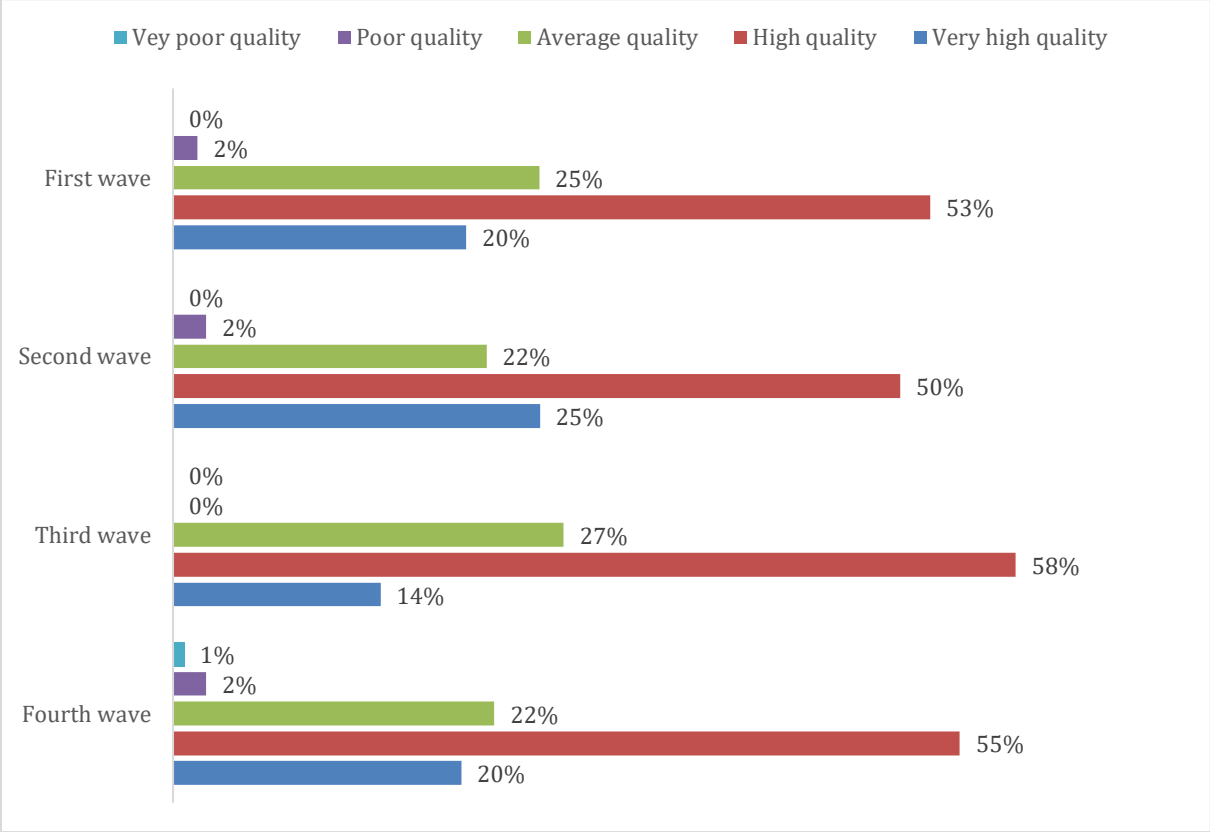

Fig. 8 The quality of the provided materials

With the last question, we found out how students would evaluate teachers and their education during the pandemic. The students had the task of assessing all the teachers who taught them during the given wave of the pandemic with one average grade (figure 9).

In the first wave of the pandemic, even if teachers were not prepared for online education, they received positive or average rating. 17% of teachers were rated excellent with grade 1. Up to 32% of teachers were rated 2 Very good. A maximum of 36% of teachers received a grade of 3 – good. Grade 4 – sufficiently – obtained 10% of teachers. Only 5% of teachers received a rating of 5 – insufficient.

In the second wave, teaching staff gained more experience with online education, and the material and technical equipment necessary for teaching was also improved. All this had a positive impact on the educational process and the evaluation of teachers. Compared to the first wave, there was an 11% increase in the best rating 1 – excellent, which rose to 28%. The rating went up even more for 2 – very good. This evaluation of teachers increased by 13% to the final 45%. The rating dropped by 12% for 3 – good. Educators received a 24% share from this evaluation. Only 3% of teachers were evaluated with grade 4 – sufficient. No teacher received a rating of 5 – insufficient.

In the third wave of the pandemic, there was a slight shift in evaluation. 13% fewer educators received the best rating of 1 – excellent. In total, educators received only 15% in this evaluation. In grade 2 – very good, there was a 7% increase compared to the second wave and the final score was 52%. It increased slightly (by 7%) compared to the second wave of the pandemic, rating 3 – good. Educators received 31% in this evaluation. Two per cent of teachers had a grade of 4 – sufficient, and one per cent a grade of 5 -inadequate. Compared to the second wave, there was a slight deterioration in the results, and the teachers got worse grades. This may also be due to the difficult subjects taught during this wave and semester.

In the fourth wave, there was a significant shift towards a better evaluation of teachers. In this wave, teachers were rated the best of all four pandemic waves. 28% of teachers received a rating of 1 – excellent, which is 13% more than in the third wave. Second-best rating 2 – very good, achieved by 51% of educators, which is only 1% less than in the previous wave. Only 17% of teachers received a grade 3 – good. It is 14% less than in the third wave. Two per cent more, a total of 4% of teachers received a grade of 4 – sufficient. No one got a grade of 5 – insufficient.

From the analysis of the respondents' answers to this question, it follows that pedagogical workers were evaluated the worst during the first wave of the pandemic. In each subsequent wave, they scored better than in the previous wave. This was due to the acquisition of experience with online education, the training of teachers to work with new digital resources by the Faculty of Education, and better material and technical provision than in the first wave. Teachers in the third wave received a slightly worse rating than the second and fourth waves, possibly due to the composition of the educational subjects and their difficulty.

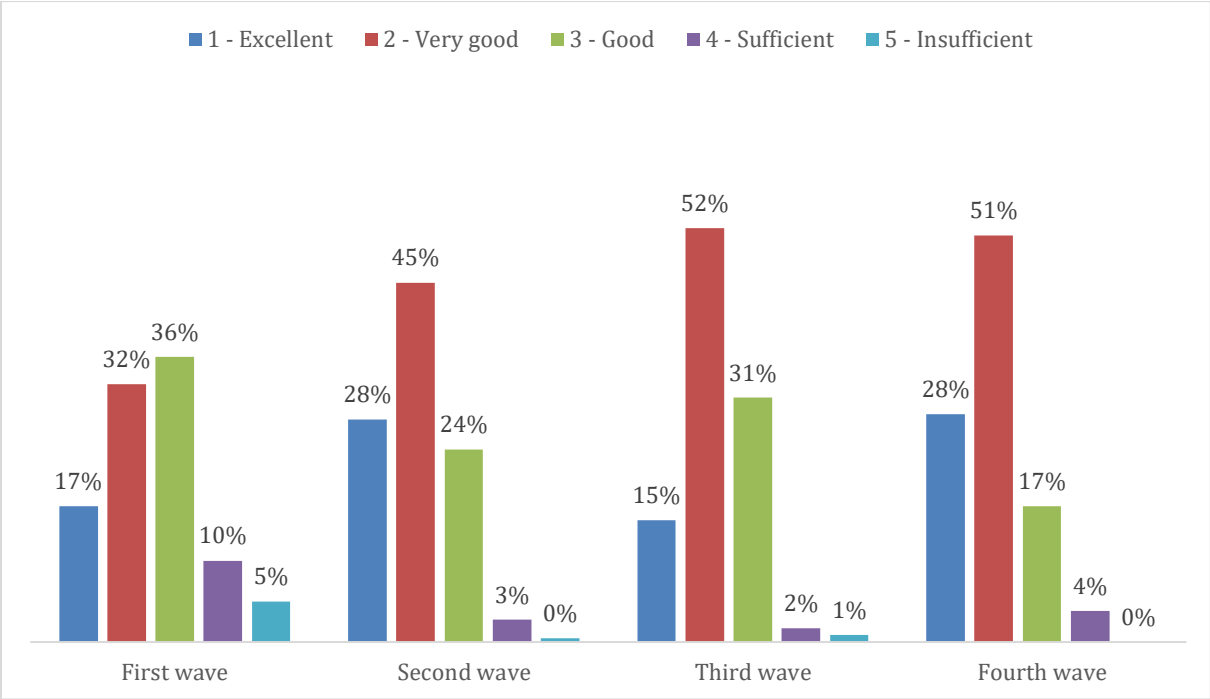

Fig. 9 Evaluation of teachers

4 CONCLUSIONS

During the pandemic, between the first and second wave of the corona crisis, there was a significant shift in the quality of education in education at the Faculty of Education of the University of Constantine the Philosopher in Nitra. The management of the university and the Faculty of Education introduced several changes and improvements to the educational process before the second wave of the pandemic. Several series of training was held to work with the e-learning system, the MS Teams application, and the university video-conference system Meet.UKF. The Meet.UKF video conference system was improved in terms of both hardware and software, which in subsequent waves worked on better servers. It was also reflected in its stability and ability to work with a more significant number of students without the application crashing. All these improvements were also reflected in the next waves.

At the Faculty of Education of the UKF in Nitra, a fixed schedule was introduced during the second wave of the pandemic so that distance learning took place exactly at the same time as if it were applied face-to-face. This also contributed to improving the educational process at the Faculty of Education.

All these improvements resulted in a more stable educational process in the second, third and fourth waves of the pandemic and a greater use of new technologies in education at the Faculty of Education. This contributed to a positive perception of the educational process by students and a positive assessment of the work of teachers by students.

From the point of view of sustainability, we note that the education system at the Faculty of Education throughout the pandemic was set up in such a way that education could continue without major problems. From the research it is obvious that distance education gradually improved in the context of the corona crisis. The improvement was noticeable in each wave from the point of view of qualitative and quantitative indicators. Improving the quality of education not only came from the technical side – hardware, software, but also from the improvement of the experience of the teachers of the Faculty of Education.

References

Anderson, M., & Jiang, J. *Teens, Social Media & Technology.* Report of the Pew Research Center. [online]. [quated 2019-09-18]. https://www.pewresearch.org

Dirgasová, S. (2022). Online vzdelávanie očami študentov VŠ, Univerzita Karlova Praha [quated 2022-10-08]. https://dspace.cuni.cz/handle/20.500.11956/175623

Espuny, C., Gonzalez, J., Lleixà, M., & Gisbert, M. University Students Attitudes Towards and Expectations of the Educational Use of Social Networks. In *RUSC. Universities and Knowledge Society Journal*, *8*, 186–199. 2011.

Gunawardena, C. N., & McIsaac, M. S.(2002) *Distance education* [quated 2022-10-08]. https://members.aect.org/edtech/ed1/pdf/13.pdf

Kostolanský, L., Šebo, M., & Tomková, V. (2019) *The preparation of teachers in the field of multimedia education*, EDULEARN19 Proceedings, pp. 1477-1483. Publication year: 2019 ISBN: 978-84-09-12031-4 ISSN: 2340-1117.

Kozík, T., Kuna, P., & Vanek, L. (2016). Participation in a disscusion about media: Technical education in Slovakia at the turn of the millennium. *International Journal of Pedagogy Innovation and New Technologies*, *3* (1), 106-110.

Manca, S., & Ranieri, M. (2013). Is it a tool suitable for learning? A critical review of the literature on Facebook as a technology-enhanced learning environment. *Journal of ComputerAssisted Learning, 29* (6), 487-504.

Niklová, M., & Šimšíková, A. (2022) *Vybrané dopady pandémie na vzdelávanie a žiakov v podmienkach slovenských škôl*. Školská a profesijná orientácia, 59.

Šebo, M. (2016). Comparison of LMS and Facebook in Terms of Education Support. In Proceedings from 3rd International Multidisciplinary Scientific Conference on Social Sciences and Arts. *Psychology and Psychiatry, Sociology and Healthcare, Education*, *3*, pp. 125-135. Sofia, Bulgaria: STEF92 Technology. doi:10.5593/sgemsocial2016B13

Šebo, M. (2020). Skúsenosti so vzdelávaním počas koronakrízy. *ITEV – Innovations and Technologies in Education, 3* (1), 64-69.

Šebo, M., & Depešová, J. (2019) *The use of facebook and lms moodle in university education*, ICERI2019 Proceedings, pp. 11702-11708.

Šebo, M., & Hašková, A. (2020). How students perceive educational support through Facebook. *Education and Self Development, 15* (3), 67-75. https://doi.org/j6dv

Teclehaimanot, B., & Hickman, T. (2011). Student-teacher interaction of Facebook: What students find appropriate. TechTrends, *55* (3), 19-30. United Nations. (2020). *Policy Brief: Education during COVIC-19 and beyond.*

Winning Robotics Competition Strategy: Theory of Creating Projects in Robotics Education

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DOI: https://doi.org/10.53349/resource.2023.is1.a1198

Abstract

The subject of robotics in education has a significant impact on the development of skills of students. Studying the main factors motivating robotics to participate in competitions, project competitions, and win prizes is always relevant. There are many competitions in robotics. In particular, one of the competitions for developing robotics in education is WRO. However, it is essential to know and research several factors that can lead to a place in a competition and support young coaches and participants. Higher education institutions that already have courses in educational robotics can benefit from the proposed approach, which allows them to develop new projects with robotics elements.

Keywords: *Education Robotics, Mentor, Competition, Strategy*

1 Introduction

The training of future STEM specialists is becoming more relevant every year for teachers and researchers [1] (Amanda Sullivan, Marina Umaschi Bers, 2019). In addition, many national and international competitions are organised in STEM to improve skills in science, technology, engineering and mathematics. Kazakhstan's educational program aims to develop and form a competitive, competent, creative, and educated person. Development of STEM skills is important to maintain competitiveness in the global economy. This is because the number of STEM employees in any country is considered a reliable indicator of the country's ability to generate ideas for innovative products and services [2] (Chew et al., 2014). STEM helps

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students learn using constructive methods to understand the content and application of knowledge [3] (Turner, 2013). As Elbasy (first President) said in his Address to the Nation, "In the New World – New Kazakhstan", we can see the success of the education reform in our country only if every citizen of the country has a qualified professional by their education and meets the requirements of the world. Therefore, in order to develop STEM skills, it is necessary to effectively use robotics in education in primary, secondary and higher education. That is why robotics in education is an indispensable tool for teaching STEM, which allows you to conduct laboratory experiments [4] (Henry Goh, Mohamad Bin Bilal Ali, 2014).

At the same time, when it comes to the learning process, there is always the issue of motivating students. An excellent, motivating way is to participate in competitions and project competitions [5]. The role of a mentor is vital in preparing students for the Olympics. The study, based on an experiment conducted for senior students of the Nazarbayev Intellectual School and students of Computer Science at the *L.N. Gumilyov Eurasian National University*, identified strategies for success in preparing for Olympic robotics and developed a model of the main functions of mentoring. There will be presented practical work of students who participated in international project competitions and were awarded prizes.

This research paper consists of the following research topics:

- winning strategies for the development of competitive robots;
- skills developed by students in the learning process through robotics.

Competitions in robotics. Currently, competitions in robotics are organised from the preparatory group to the university level. The most famous of these competitions are the World Robot Olympiad (WRO) , FIRST Robotics, and VEX Robotics competitions [1].

In general, Olympic robotics is divided into two areas:

- the first is sports robotics (Competitive robotics) - robots are created to perform a specific task;
- second – project robotics projects allow students to study different areas of science and technology to acquire different knowledge and skills, respectively.

In the project work, students learn various environmental or social issues and different science components, think critically, and offer solutions to problems by solving non-standard tasks. Thus, they obtain a wide range of skills in addition to knowledge.

The WRO is an international robotics competition for pupils and students between the ages of 10 and 21. More than 23,000 students from 74 countries participate yearly in the competition. Competitions are held based on LEGO MINDSTORMS Education EV3 constructors in four categories for sports and design robotics:

- main;
- creative;
- robot football;
- advanced Robotics Challenge.

Annually the state organises the Olympic task within the project category.

2 Course Design

Mentoring.

Some studies have found that male and female mentors have different experiences. This shows that male mentors pay more attention to practical work and have well-developed design skills [1] (Amanda Sullivan, Marina Umaschi Bers, 2019). The peculiarity of the discipline of robotics requires attention to practical knowledge. That is, mentors must constantly improve their knowledge and be able to work on the content of the subject in the following languages and laboratories: LegoMindstorms EV3, Arduino, Raspberry pi, Machine learning, Python, Java, C++, 3D printing, etc. The primary function of the mentor is to identify team members and guide them in developing project work [6]. However, at each stage of project development, there is a need to determine the role of the mentor. During the experiment, a series of lessons for LegoMindstorms EV3, Arduino, and Machine learning was developed for the graduates of the Eurasian National University named after L.Gumilyov, the structure of the project work was determined and the role of the mentor at each stage was determined.

Methods overview.

The study was attended by participants and mentors of the WRO Olympiad and students of the University majoring in computer science, STEM. The study included an online survey of questions related to the program's content, which teaches robotics in education. The survey was conducted for mentors and students with experience. The results of the WRO Robotics Olympiad for the last 5 years were analysed, and strategies for victory were identified. As a result of this research, training software and a unique model for the work of the mentor were developed.

Data collections.

Data were collected through two questionnaires (mentor questionnaire and student questionnaire). University students answered both questionnaires. This is because future professionals need to answer questions about their interests and beliefs as a student and as a mentor. Students were asked questions related to their participation in sports and project competitions. Accordingly, questions were asked about the general team experience, and the satisfaction of the mentor's experience, which tests the knowledge of each category of the Olympiad. 237 out of 390 Nazarbayev Intellectual Schools students who participated in the WRO competition responded to the survey. Mentors with 20 experiences who mentored these students participated, and 69 bachelor's and 28 master's of university students also participated.

Sports robotechnics.

The main category of the WRO Olympiad is a challenge-based competition. Students must design, build, and program robots to solve specific field problems over time. Points are awarded for completing tasks. The total number of points of the team is based on the time spent collecting points.

3 Research Results

Victory strategy №1-Decomposition
According to the results of the survey: “Do you decompose in solving Olympic problems?” 47% – “yes”, 35% – “no”, 18% – “I do not know what the decomposition”.

However, when performing any complex task, it is better to decompose first. That is, the first strategy for victory is to classify a complex task into several small tasks Figure 1 [7] (John R. Frederiksen Barbara Y. White).

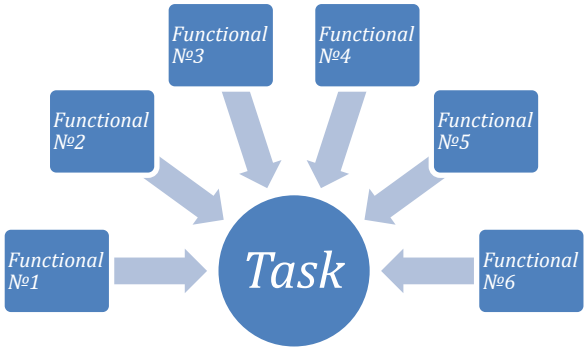

Fig. 1: Model of decomposition.

Students were asked to decompose the following task (Figure 2). In Lego mindstorms EV3, you can build your own block for decoding program code: It has the following advantages:

- easy to understand code;
- errors can be detected quickly.

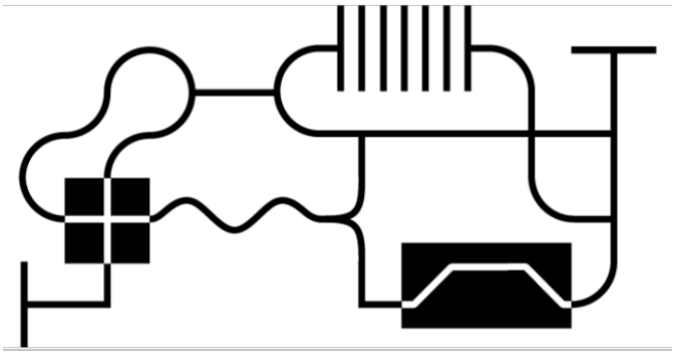

Fig. 2: Game field for line following

As a result of:

- optimal geometry of the kinematic scheme for the task;
- line movement on the PD-regulator on two sensors;

- zebra: Direct movement with synchronization of engines;
- exit from the cycle (movement along the line) on the event;
- my block (procedure): movement along the line to the cross, to the assigned encoder;
- turn left, turn right;
- search G-shaped turn;
- search for a T-shaped cross;
- search inversion;
- inversion ride;
- search for inversions.

Victory strategy №2-algorithm of exact alignment (exact alignment)

Accurate alignment is essential for the robot to perform the task correctly. Therefore, we use the following algorithms from the SeparateAlignment and PID procedures for the robot to move straight. The SeparateAlignment procedure allows you to use a separate proportional regulator (PD) for each motor. If the two wheels are equal, we run an algorithm (Figure 3) for the proportional integral differential regulator (PID).

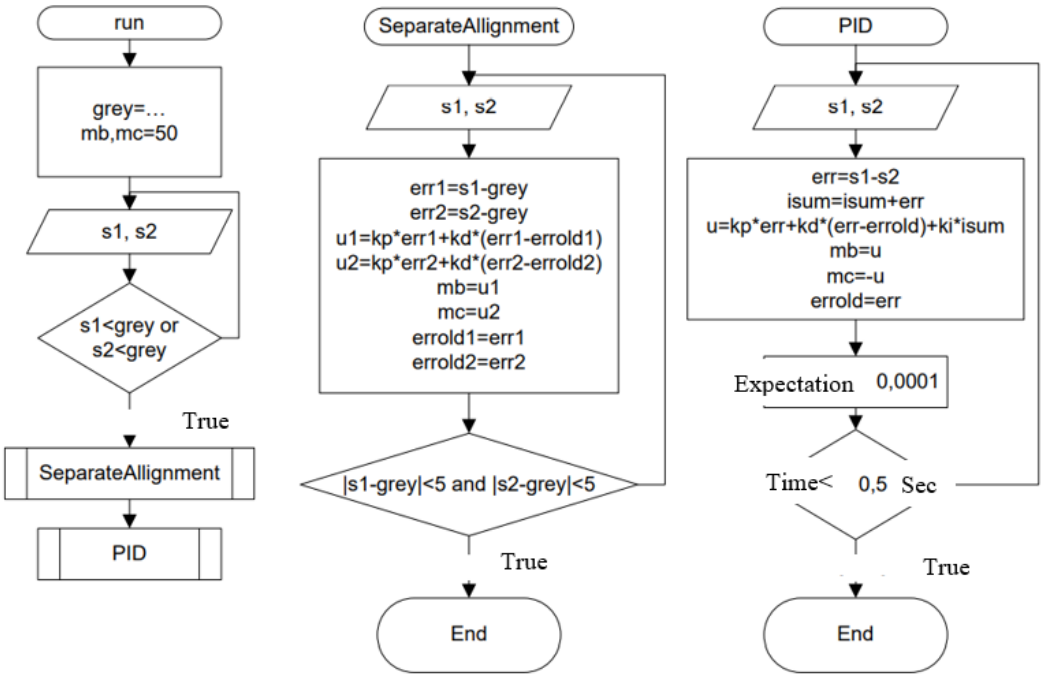

Fig. 3: Algorithm of exact alignment

The survey found that the two algorithms are often used separately to align the robot accurately. As a result of the experiment, the students determined the optimal coefficient of the PD and PID algorithms for the lego mindstorms EV3 robot when moving along the black line.

Project robotechnics. The method based on project work is relevant in the teaching of robotics. There are also competitions among project works in the Olympiads aimed at STEM

robotics. Over the years, the work of the creative category of the WRO Olympiad has been analysed and the following winning strategy has been developed:

1. The most important thing is to choose a particularly relevant topic;
2. The most difficult is the high level of technical implementation;
3. The easiest way is to follow the other points on the evaluation sheet.

To describe the structure of this victory strategy in more detail, we propose the following project development structure model (Figure 4).

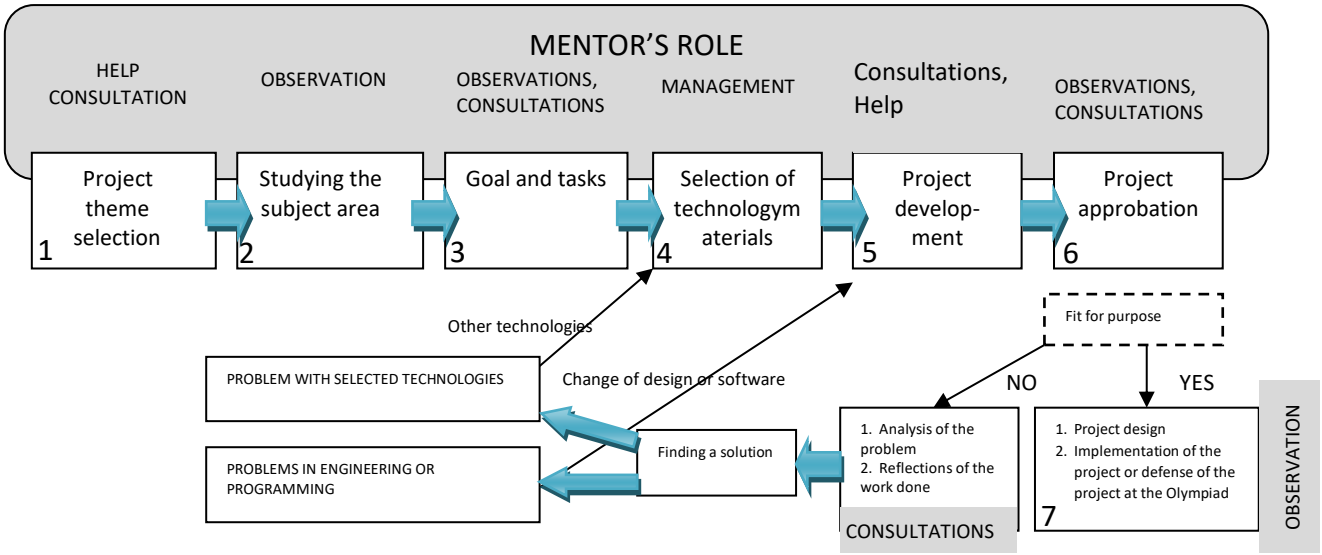

Fig. 4: Project development structure model

Project work consists of 7 stages: selection of the project topic, study of the industry, setting goals and objectives, selection of materials technology, project development and testing of the project, preparation for project defense. If we consider the research work that focuses on each stage:

The following criteria were used to select the topic of the project:

- the project must be practice-based and robotic (includes project prototype, device development, as well as the use of artificial intelligence);
- the project should be relevant to today's trends in science and technology;
- the project must be useful for economic, social or other development;
- it is necessary to use cross-cutting areas, mixed with different sciences.

At this stage, students study the problem to be solved, determine the relevance and novelty of this problem.

1. Study of the subject area:
   - detailed study of the problem (detailed description of the problem to be solved by the project) or a detailed description of the research problem;
   - analyze other solutions to the problem or other methods of conducting this research.

This information allows you to see the need for project work and formulate its goals and objectives.

2. Setting goals and objectives. On the basis of the subject area and other methods of solving this problem, students:

- defines the main objectives of the project;
- clearly defines the vision of the final result of the project;
- defines in detail all the tasks for project development.

3. Selection of technologies and materials. It is a very crucial stage because many students make mistakes at this stage, as a result of which, at the end of the work, they do not achieve their goals due to insufficient technical capabilities of the selected technology.

Today, there are many laboratory kits for the study of robotics. Each collection can be selected and analysed according to the age of the students (Table 1), as well as the difficulty level, capabilities, and price.

Lego WeDo Primary school	The simplicity of construction and design No special knowledge is required; everything you need is taught in the classroom.
Lego Mindstorms EV3 Education Primary and secondary school	average complexity of construction and design logical thinking skills
Arduino High school	high complexity of construction and design logical thinking skills, physics (electronics, mechanics)
Raspberry Pi, STM32, machine learning, neural network High school, and university students	very high structural complexity and complex programming Good knowledge of C ++, Java, and Python programming knowledge of physics (electronics, mechanics)

Table 1: Result of analyzing according to the age of the students, level of difficulty, capabilities, and price

4. Project development:

- at this stage, students create a design (layout) of the project;
- develop a robot or project concept;
- model models and mechanisms;
- print models from a 3D printer;
- write program.

4 Conclusions

Students test and analyze the design of the robot in accordance with the goals and objectives of the project. Determines whether the robot is working properly.
If the robot is working following the planned purpose, it is prepared for the external decoration of the project, the implementation of the project in production or defence in competitions. Conversely, if the goal is not met, the problem is searched, analyzed and returned to the fourth and fifth stages.

Today, research shows that robotics affects many aspects of education and profoundly affects students' abilities and skills. In the discipline of robotics 21st Century Skills, including Learning, Creativity, Research, Collaboration and Teamwork, Self-Governance, Communication, etc. Skills are described in several studies (Khanlari, 2013; Hussain et al.,2006; Nugent et al., 2010; Arlegui et al., 2008; Demetriou, 2011).

Therefore, an in-depth study of robotics in STEM education and training of students will increase its relevance. In addition, the organisation of Olympic competitions has contributed to the formation of skills. During the experiment, mini-competitions were held within the group. In developing a competitive robot, it was observed that students had developed the necessary skills for the 21st century. In other words, the team developed communication, teamwork, critical thinking, and project presentation, i.e. leadership skills. The best projects were nominated for national and international competitions. The following works were submitted to the international competition, and the best team was included in 10 projects.

References

Sullivan, A., & Bers, M.U. (2019). *VEX Robotics Competitions: Gender Differences in Student Attitudes and Experiences.* https://www.researchgate.net/publication/345037584

Meng Ch. Ch., Idris, N., & Eu, L.K. (2014) Secondary Students' Perceptions of Assessments in Science, Technology, Engineering, and Mathematics (STEM)// *Eurasia Journal of Mathematics, Science & Technology Education*. *10* (3), P. 219-227.

Turner, K.B. (2013). *Northeast Tennessee Educators' Perception of STEM Education Implementation*. https://dc.etsu.edu/etd/1202/

Goh, H., & Ali, M. B. B. (2014) *Robotics as a tool to Steam learning*. https://scholarsjournal.net/index.php/ijier/article/view/248

Bazylev, D., Margun, A., Zimenko, K., Kremlev, A., & Rukuizha, E. (2014). *Participation in the robotics competitions as a motivation for learning*. https://www.sciencedirect.com/science

Dolenc, N. R., & Tai, R.H., & Williams, D. (2020). *Excessive Mentoring? An Apprenticeship Model on a Robotics Team.* https://j-stem.net/index.php/jstem/article/view/81

Frederiksen, J.R., & White, B.Y. (1989) *An approach to training based upon principled task decomposition*. Acta Psychologica, *71*, 1-3, 89-146.

The motivation of Adolescents to Choose a Secondary Vocational School

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DOI: https://doi.org/10.53349/resource.2023.is1.a1199

Abstract

The authors reflect on the motivation of adolescents to attend secondary vocational schools. For adolescents, this step represents one of the fundamental career decisions. The intrinsic motivation of applicants to study is often interest in the field, employment, or financial reward. Other motivating factors for studying are the transport accessibility of the school and the difficulty of the admission procedure. Aspiring secondary school students are also motivated by the prestige of the school that offers them an educational programme. In addition to the well-known promotions, adolescents can also attend extracurricular activities (hobbies) organised in secondary vocational schools. The authors make their statements based on the opinions of primary school teachers and secondary school students who evaluate their motivation for education in their field of study. At the end of the paper, the authors evaluate and discuss the originality of the possible promotion of secondary vocational education.

Keywords: Student motivation, School presentations, School promotion, Secondary vocational school

1 Introduction

Everyone has three life periods related to work activity: preparation for active life and work (education period), active work activity and retirement age. All these periods are essential in an individual's life because they significantly impact the future quality of his/her life. The preparation of the individual for these periods begins already in kindergarten (ISCED 2011 0) and naturally continues in primary school (ISCED 2011 1) and secondary school (ISCED 2011

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2). But we often ask ourselves whether secondary school (ISCED 2011 2) graduates are sufficiently prepared for future education at secondary (vocational) schools (ISCED 2011 3). Parents often help their children to choose a secondary (vocational) school. Parents' recommendations are usually based on their experiences in the labour market. The secondary (vocational) school choice is influenced by the social environment in which the pupil grows up, character, needs, beliefs, opinions, life goals, and value system. All the above factors have an impact on the choice of a primary school pupil's future occupation and his/her attitude towards work.

Pupils' lack of interest in secondary vocational education is a global problem. In the Czech Republic, the interest of primary school pupils in secondary (vocational) schools is also declining, which has a negative impact on the number of pupils in secondary (vocational) schools.

2 Factors Influencing Career Choice

The choice of secondary school results from a long process of internal and external factors. Internal factors only play a role in the final career choice. These are subjective perceptions, feelings, interests, and expectations. The choice is mainly influenced by the social context, the socio-cultural environment, and the family environment in which the pupil grows up, but nowadays, the influence of mass media is also growing significantly. An important factor is the economic situation in the student's family, the perception of the prestige of different professions from a financial perspective and the related social status of the individual. One of the indicators in the choice of a future career of pupils is employment in the labour market. We call these factors external factors, which majorly impact occupational choice. The pupil's social community and peers also play an essential role in choosing a secondary (vocational) school and related career. The school and the teachers' personalities also influence the pupil's decision-making process. For undecided pupils, the information and guidance system is crucial. (Walterová & Greger, 2009)

The family fundamentally forms the personality of their children. It is the parents who become great role models in the lives of their children. According to Hlaďo & Michalicová (2014, p. 37), the family, i.e., the parents, is the most important factor influencing any decision-making.

Čačka (2000, p. 222) characterises the family as the primary group we do not choose, but its relationships are the most significant and deeply formative social environment for everyone. Each child's personality develops appropriately, especially in a harmonious environment where everyone plays a role, which is a generally accepted prescription for social behaviour.

The family is supported in shaping career perspectives and provides primary guidance in choosing a secondary (vocational) school. The period of choosing a secondary (vocational) school is a particular time in the life of a family. It is usually accompanied by a deeper

acquaintance of the child with his/her parents. There is a mutual convergence of the parent's and children's attitudes, reflected in the final decision. (Walterová & Greger, 2009)
Each family member has different participation levels in making career decisions. Ideally, both parents are engaged in the child's career choice. Older siblings also play a specific role as they represent an essential source of information about secondary (vocational) school and are another family factor that affects the formation of plans concerning education and profession (Hlaďo & Michalicová, 2014, p. 37).

During adolescence, peers are essential to children who share their opinions, values, ideals, and preferred way of life. Being tied to a group reduces individual responsibility and increases self-esteem and self-confidence (Vágnerová, 2005). Research shows that peers have the most significant influence on the provision of information. These are mostly older friends already studying or have studied at their respective secondary (vocational) schools (Hlaďo & Michalicová, 2014, p. 43). Peers and peer groups play an essential role in career decisions. On the other hand, friends can positively impact an individual, manifesting in pursuing better performance and, thus, better results. Unfortunately, children are often involved in groups that have a negative impact on learning outcomes and overall behaviour. Peers often become informal authority figures who may have a more significant impact than adults in certain situations. Adolescent children often follow the leader or star of the party, and the family, including parents, takes a back seat. In a peer group, individuals compare themselves and become aware of the similarities and differences between other children. A peer group provides emotional experiences better than a family because there are many more differences between adults and children (Vágnerová, 2005).

According to Walter (2009), the school has traditionally been seen as an institution that can and should influence a pupil's decision-making. However, a tiny proportion of pupils believe that the school would significantly influence their choice. However, the school activities are more informative. The school informs pupils about the courses, when and how to apply, and the services other guidance institutions offer. School support, therefore, focuses more on the final stage of decision-making. Pupils and parents may turn to guidance counsellors as part of their decision-making journey, but very few do so (Walterová & Greger, 2009).

Adolescents are increasingly critical of teacher demands and school standards. However, some students are positively influenced by their personalities, which motivates them to work and awakens their interest in the field (Smit et al., 2021). The school plays an indispensable role in this area because, together with the family, it helps children to form realistic career goals and perspectives. Their main task is to equip students with the competencies to use guidance services and information resources effectively and to learn to make independent and responsible decisions according to them. It is all about making them aware of which work and education factors to consider when choosing a career, how important they are, how to assess them and where to get information about them (VYSOČINA EDUCATION, 2000). At school, pupils should learn to know themselves, their interests, possibilities, and limits to navigate the world of work and education better. The fact that the school, together with the family, is one of the key institutions that should prepare children for a career has been

recognised by curriculum developers. They have included systematic education in this area in the Framework Educational Programmes, in which a separate thematic area on the World of work (part of the educational area Man and the world of work), is devoted to the choice of profession. Its concept builds on the educational field of Vocational Education, which has been compulsorily included in previous educational programmes since 2002 based on methodological instructions of the Ministry of Education of the Czech Republic (it was usually taught within the subjects of Civic Education, Family Education or Practical Activities), (Moderní vyučování, 2016).

The World of Work is now compulsory for all pupils. Given the focus on career choices, schools include the topic in the upper years of secondary school (ISCED 2011 2). A significant emphasis is placed on cross-curricular relationships to lead in a coordinated way to responsible career choices. The main aim is for pupils to learn how to navigate the educational offer of secondary (vocational) school and the work activities of selected professions and to gain the ability to effectively use professional information and advisory services for the choice of education. Furthermore, they should be able to assess the various options when deciding on a suitable career and vocational training.

3 Career Counselling and Guidance Assistance

The guidance and career counsellor performs counselling and information activities. The counsellor's activities include an introductory group survey, an analysis of pupils' career preferences, an individual assessment for career choice and individual counselling in this area. The counsellor cooperates with the class teacher, the pupil's legal representative, and school counselling facilities such as the pedagogical-psychological counselling centre, the education centre, and the educational care centre in providing counselling services beyond the school's remit (VYSOČINA EDUCATION, 2000).

Counsellors arrange group visits of school pupils to the information counselling centres of the labour offices and provide information to pupils and parents on the possibility of individual use of the information services of these centres (VYSOČINA EDUCATION, 2000). Counsellor also Provides moderate diagnosis of special educational needs (initial and ongoing) and intervention activities for pupils with special educational needs. Preparation of conditions for the integration of pupils with special educational needs at school, coordination of the provision of counselling services to these pupils by the school and school counselling facilities, and coordination of educational measures (including special arrangements for entrance examinations and final examinations) for these pupils (VYSOČINA EDUCATION, 2000).

The web portals used by counsellors in secondary school (ISCED 2011 2) are mainly:

- The School Atlas (www.atlasskolstvi.cz) is the most used portal among secondary school counsellors,

- The National Institute for Education website www.infoabsolvent.cz is the second most used portal among secondary school counsellors,
- Frequently used portals among secondary school counsellors include www.stredniskoly.cz and www.volbapovolani.cz.

(This is followed by www.seznamskol.eu, www.gwo.cz, www.stredniskoly.eu, www.istp.cz):

Pupils mainly use the official websites of secondary schools and databases of secondary schools, where they search for specific information about educational institutions and educational opportunities (educational programmes, admission conditions, number of admitted pupils, the success rate of secondary school graduates in entering tertiary education, etc.). In addition to these Internet resources, pupils search for Internet servers with information on how to proceed in choosing a secondary school, and how to prepare for entrance exams, or they search the Internet for personality tests that enable pupils to know themselves, which are essential both for choosing a secondary school and for their future profession (Národní ústav odborného vzdělávání, 2008).

Secondary (vocational) schoolwork with the pupils and their parents in choosing a career and a secondary (vocational) school. They provide detailed information through printed materials, brochures, website information, invitations to open days, etc. Visits to secondary (vocational) schools themselves are very popular with primary school pupils, where pupils are directly involved in various activities, e.g., making a simple product out of wood or metal (Národní ústav odborného vzdělávání, 2008).

Primary school pupils have many printed materials to support the right career choice. These include handbooks, leaflets, textbooks, brochures, and catalogues on the educational offer of high schools, guides on preparing for entrance examinations, tests, labour market statistics, etc. Their advantage lies in their use; we can work with them practically anywhere. The disadvantage is that printed materials are limited in scope and quickly become outdated (Národní ústav odborného vzdělávání, 2008).

Television, newspapers, and magazines are the least valuable sources of information about high schools for pupils. However, the impact of the mass media on the choice of further education and career paths cannot be underestimated. The mass communication media shows important aspects of the labour market and shapes professional stereotypes reflected in educational and professional paths. Identification with characters from the audio-visual world through informal experiential learning significantly influences pupils' career orientation (Národní ústav odborného vzdělávání, 2008).

4 Original and Interesting Presentations of Secondary Vocational School

As part of the project, the Secondary Vocational School of Transport, Trade and Services in Moravský Krumlov addressed undecided pupils or tried to convince those who were already clear about their direction when they entered the school. It prepared several technical clubs to motivate pupils to choose a career and study at a secondary vocational school. The activity was implemented to improve the quality of science and technical education in secondary (vocational) and primary schools and to support the development of cooperation between secondary (vocational) schools and primary schools in the South Moravian Region.

The Secondary Vocational School of Transport, Trade and Services in Moravské Krumlov is an internationally certified International Education Society, London (IES) school. Pupils can obtain an international IES certificate. The school uses a quality management system to administer and manage school management, education, and related services. It is ISO 9001:2009 certified. The school provides education in its facilities with equipment that meets the needs of the fields of education with a school-leaving exam (in Germany means Abitur) and the fields of education with teaching and their perspectives. Almost all workplaces have undergone extensive reconstruction in recent years, meeting the strict criteria set for teaching and learning.

One of the prerequisites for successful vocational education in Moravský Krumlov is the implementation of school educational programmes in practice. The activity aimed to establish a system of long-term and systematic cooperation between the Secondary Vocational School of Transport, Trade and Services Moravský Krumlov and primary schools in the region. Another goal of this cooperation was to increase the interest of primary school pupils in technical fields. Secondary school teachers created particular interest, technically oriented clubs for primary school pupils.

The seven technical clubs, 128 lessons, educated pupils from seven primary schools in various technical areas. The activities included the participation of experts from companies who provided a small demonstration of their field and gave professional presentations at primary schools, combined with a discussion on training and employment opportunities in their field of study. In the 2014/2015 to 2016/2017 school year, 140 primary school pupils could participate in the technical clubs they attended. In terms of production practice, the experts made 35 presentations attended by a total of around 500 primary school pupils. The technical clubs were intended for pupils of the 9th grade of primary school. Both boys and girls attended the club. Registration for the technical club was voluntary. At the first meetings, it was apparent that the pupils enjoyed working, especially if they could make something themselves, even under the supervision of a teacher and older students at the secondary vocational school. Many emphases were placed on allowing the students to create something and take the product home.

The aim was to introduce pupils to individually taught educational disciplines in an exciting and friendly way. Show them how an auto mechanic, an auto technician, a locksmith, a carpenter, a blacksmith or how complicated it is to write a program for machining material on a CNC machine. Pupils learn the basics of car construction in the Aeromechanics and Motorcycles Club and the basics of motor vehicle electronics, including the measurement of fundamental electronic quantities obtained from vehicle sensors, which are further transmitted to the vehicle control unit. Depending on the pupils' skills and abilities, the vocational school in Moravský Krumlov prepared a programme for building a go-kart, which the pupils successfully and enthusiastically assembled. As part of the Locksmith, Machinist club, the pupils were introduced to the basics of manual metal working – contouring, cutting, filing, and sawing. Under the supervision of a high school teacher, the pupils tried their hand at machine tools – drilling, turning, milling, turning, and grinding. They made their products according to the supplied drawing documentation during the lesson. The pupils in the Blacksmith's Club could try out the basic forging operations with metal, learn how to operate the forging furnace, select the correct steel for heating and choose the right heating temperature. Within the framework of the interested club, pupils made simple blacksmithing products. Pupils learned the basics of woodworking in the Carpenter's Club.

5 Discussion and Conclusion

Motivating pupils to choose a career is a long and complicated process of increasing interest in vocational education programmes. It cannot show any easy or quick solution. Open Days and Secondary School Fairs are trendy, as are Company Days, which motivate primary school pupils to choose a secondary vocational school as a motivation for their future profession. The results of the projects mentioned above show that career learning theory is a solid basis for organising teaching and guidance in the field of education and careers.

Vocational schools want to show pupils the potential and enthusiasm of their specific programmes and careers in their last year at primary school. A foreign author (Poulsen, 2020) states that in most cases, these are promotional days that allow pupils to gain different knowledge about perspectives of vocational education programs or interact/talk with vocational students. Nevertheless, ensuring that the pupils' experiences are as close as possible to the standard vocational training conditions to achieve real vocational education and training is vital. For this reason, the promotion days are carried out during the regular school lessons. Communication between future students at the secondary vocational school and current students is constructive and can be said to be important when pupils choose a career.

Ivánková et al. (2022) also give examples of science camps to prepare pupils for future careers. Thus, they propose an unconventional approach to teaching science with interest, curiosity, attraction, and fun. Science camps as an experiential form of informal education can help to improve the perspective of pupils and students on science. Pupils see science camps

as an important motivating factor for further study of science, which will influence their future career choices.

Those mentioned non-traditional motivational activities for future secondary (vocational) school students are also implemented in various fields of education in the Czech Republic. The described activities are very popular with primary school pupils, and their participation is always high. For example, a secondary vocational school specialising in polygraphic production organises suburban camps. Primary school pupils are introduced to simple work in a bookbinding workshop, designing book covers on computer software.

The promotion of secondary vocational schools is now moving into informal, experiential education through special interest clubs, camps, or open days. Pupils and their parents have a unique opportunity to discuss with teachers and students at the secondary vocational school. Parents and Pupils can see the material equipment of the school and can compare the different schools. It is important to emphasise that this will give both the primary school pupil and the parent a realistic idea of the specific field of education.

References

Čačka, O. (2000). *Psychologie duševního vývoje dětí a dospívajících s faktory optimalizace*. Brno : DOPLNĚK.

Hlaďo, P., & Michalicová, J. (2014). *Kroky k povolání: [praktické náměty pro výchovné a kariérové poradce na základních školách*. Raabe.

Ivánková, P., Halákova, Z., & Čolláková, D. (2022). The Influence of a Science Camp Experience on Pupils Motivating to Study Natural Sciences. *Eurasia Journal of Mathematics, Science and Technology Education*, *18* (3), 1-11. https://doi.org/10.29333/ejmste/11709

Moderní vyučování. (2016) Svět *práce*. Volba povolání (část. 1). http://www.modernivyucovani.cz

Národní ústav odborného vzdělávání. (2008). http://www.nuov.cz

Poulsen, B. K. (2020). Insights and Outlooks: career learning in the final years of compulsory school. *Education Inquiry*, *11*(4), 316-330. https://www.tandfonline.com

Smit, R., Robin, N., De Toffol, C., & Atanasova, S. (2021). Industry-school projects as an aim to foster secondary school students' interest in technology and engineering careers. *International Journal of Technology and Design Education*, *31* (1), 61-79. https://doi.org/10.1007/s10798-019-09538-0

Vágnerová, M. (2005). *Školní poradenská psychologie pro pedagogy.* Karolinum.

VYSOČINA EDUCATION. (2000). http://www.vys-edu.cz

Walterová, E., & Greger, D. (2009). *Přechod žáků ze základní na střední školu: pohledy z výzkumů.* Paido.

Examination and Comparison of the Tasks Related to the Era of Dualism in the Hungarian Language Textbooks of History Used in Slovakia and Hungary in 2022

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DOI: https://doi.org/10.53349/resource.2023.is1.a1200

Abstract

The present research paper aims to examine and analyse what tasks are included in the History coursebooks published to be used today (2022) in Hungary and Slovakia in schools with Hungarian language tuition. The research does not cover the examination of History textbooks at all grades of primary school education. Still, it is restricted to steps 7 (in Hungary) and 8 (in Slovakia) and focuses on chapters dealing with the Era of Dualism (1867–1918). The tasks that can be found in the textbooks will be examined both from qualitative and quantitative perspectives. In the second part of the research, these tasks will be categorised according to the appropriate level of Bloom's taxonomy, according to which skills and competencies are addressed to be developed. Finally, the tasks found in History textbooks used in Slovakia (in schools with Hungarian language tuition) and Hungary will be compared in quantitative and qualitative terms.

Keywords: *Textbook review, Era of dualism, Bloom's taxonomy, Comparison*

1 Literature review

First, we need to clarify what we mean by the term textbook. We illustrate the possible interpretations of the concept of the textbook with a few examples provided by scholars in the distant and fairly recent past. According to the Hungarian Pedagogical Lexicon: "a textbook is a book that supports teaching and learning, which covers the knowledge of science, literature, art, industry, commerce, etc., which we want to master or make [students] master." (Magyar Pedagógiai Lexikon, 2, 1934, p. 784)

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According to the proposition of the Volk und Wissen Verlag publishing house (1967, p. 64) "a textbook is understood to be an educational tool in the form of a book or a booklet, from which students acquire knowledge and skills, and can draw firm attitudes and convictions in the course of the teaching and educational process guided by the teacher."
According to Ellington & Harris (1986, p. 169), a textbook is "a book in the service of education which contains the material of a subject or field of expertise in a systematic, comprehensible and progressive form, and which can thus be used as a basic source of knowledge to be acquired in the teaching or learning of that subject or field of expertise."

According to Ábrahám (1993, p. 3), "The concept of a textbook can be defined in different ways: we can say that any book that serves to increase knowledge is a textbook. This is an extensive interpretation, as we could also call the telephone directory a textbook". Collins Dictionary defines a textbook as „a book containing facts about a particular subject that is used by people studying that subject" (Collins Dictionary, 2022, Definition of „textbook").
We can see that there are differences between textbook definitions from different periods, but there are some aspects that can be found in most definitions. Karlovitz (2000) examined the different textbook definitions and concluded that:

> "The textbook is an important (the most important) education tool. It contains and publishes curriculum-subject material for a longer period, i.e., it is an informative document and a source of knowledge, but its effect on developing skills and abilities is also emphasised. It provides the learning material in a didactic format adapted to the users' age and level of development, making it learnable and teachable. It is primarily for the learners but also underpins and supports the teacher's work and the entire educational process." (Karlovitz, 2000)

According to Hummel (1988), the school textbook assumes numerous functions. One of them is to provide the child with one of his/her first contacts with the printed word and the book. This is significant in developing countries where the school textbook is often the first book in the home and may serve the parents and students. It is one of the first, if not the first, sources of reading matter.
Karlovitz (2000) emphasises the fact that:

> "an important and interesting criterion (and also a requirement) is the textbook's characteristic of being easily accessible and, at the same time, the cheapest of the teaching tools, and thus a 'democratic' medium that ensures equal opportunities". Karlovitz has written some studies on textbook theory, which are primarily intended for teachers. According to Schüttler, Karlovitz's books are primarily aimed at teachers because "since the early 1990s, the textbook market has expanded to an incredible extent, the former "on-textbook" world has been replaced by a diversity that was once considered unimaginable and in which it is increasingly difficult to navigate." (Schüttler, 2003)

The demand for textbook analysis first appeared in the 19th century, to be precise, within the framework of the peace and socialist movements. Even then, researchers knew, regardless of the textbook writers' intentions, textbooks contained various errors, distortions or even hidden messages, which was especially true in the case of history, geography, and language textbooks, where various national prejudices, hidden or unconcealed enemy images, as well as excessive national glorification or contempt for other peoples were evident (F. Dárdai, 1999; Karlovitz, 1988).

According to Weinbrenner (2016, qt. in Tóth, 2017, p. 284), textbook research is only context research. According to Weinbrenner's complex model, the textbook can be interpreted as a process, a product, or a social factor. According to product-oriented textbook research, the textbook is nothing more than a tool for education and visual communication whose content can be examined in longitudinal (historical) and cross-sectional (comparative) dimensions. These can be aimed at questions of scientific theory, subject matter, didactics, pedagogy, and implementation (book design). Stein (qt. in Tóth, 2017, p. 284) was the one who took textbook research out of the narrow world of pedagogy and placed it in a broader school policy framework since, in his opinion, textbooks can be examined from three perspectives: (1) as information carriers – content dimension, (2) as teaching tools based on didactic principles and embedded in the educational (teaching-learning) process – pedagogical dimension, and (3) as communication tools in socio-political conditions – school policy dimension. Simon (2017, p. 20) shows what themes emerge as research directions in textbook analysis: “theoretical questions and methodology of textbook research, [...] characteristics of textbook texts [...], and textbook policy”.

Simon (2017, p. 20) draws our attention to the fact that “Hungarian textbook writing and curriculum development in Slovakia has remained unreflected for a long time; it is only recently that the first textbook analysis volumes have started to appear not too long ago [...], and it is gratifying that the topics of these textbook analysis volumes have recently been broadened”.

The number of studies examining Hungarian history textbooks in Slovakia has also increased. Engel & Vajda (2021, p. 133–136) analysed the didactic role of images. In their research, they worked with three history textbooks currently used in Slovakia's 5th, 6th, and 7th grades of primary schools. The authors first examined the structure of the textbooks, then grouped the images in the textbooks according to their functions in the teaching process and paid particular attention to the maps included in the textbooks.

Engel & Vajda (2021, p. 149) concluded that “due to the size of the textbook illustrations, the negligible amount of questions, tasks and exercises connected to them, and their low didactic preparation, the images under study have a purely decorative role, so they cannot be considered as a source, but only as illustrations.”

We can agree that even if they are criticised (Marsden, 2001), textbooks occupy an important place in the school system (Simon, 2017; Bruillard, 2021). Karlovitz (2001, 80–88) distinguishes five types of textbooks based on their function dominance (textbook engagement). There are (1) traditional (descriptive, informative) type textbooks, (2)

information processing and action textbooks, (3) programmed textbooks, (4) panoramic textbooks, and (5) textbooks with the tools of modern technology.

In our case, the textbooks of interest are the traditional textbooks (1) and the type of information processing and action textbooks (2). Traditional textbooks serve to store and communicate knowledge (information). It is a one-way flow of information, where the textbook is the informant, the communicator, the holder and transmitter of knowledge, and the learner is the "receiver", the recipient of knowledge, in fact (at least in the majority of traditional textbooks) a passive recipient. This type includes (a) information-storing or descriptive textbooks, (b) information (curriculum) transferring, i.e., information-communicating textbooks, and (c) "minimum textbooks", which are limited to communicating only the most critical information, are very concise and restrained, economical and inexpensive. However, when they are used, other books and the additional contribution of teachers are also needed (Karlovitz, 2001, p. 80).

The textbooks that process and apply the curriculum aim to develop skills in which transformational roles (application, practice) dominate. Textbook questions and tasks, which we are also examining, can fulfil several didactic functions: (a) they direct attention to the most important parts, the parts "to be learned"; (b) they have a reinforcing effect; (c) they prompt observation; (d) they are to develop skills (for example, to improve reading skills); (e) they create concentration with other parts of the material (beyond the subject) or with material from other subjects; (f) they relate the text to the learners' lives and daily practice; (g) they recall previous experiences and learning; (h) they inspire collecting work; (i) they encourage to review knowledge; (j) they help organisation and repetition; (k) they provide practice; and (l) they refer to sources of further information (Karlovitz, 2001, pp. 81–82).

The presentation of Bloom's taxonomy (1956) and the revised Bloom taxonomy (Anderson, Krathwohl, 2001) is essential for our study since, during our research, we want to match the questions and tasks found in the textbooks under study to the different levels of Bloom's taxonomy, depending on which cognitive levels they develop.

Bloom's taxonomy of educational objectives means the hierarchical classification of learning objectives, i.e., the systematisation of the knowledge of history according to specific principles to make history teachable and, on the part of learners, learnable and understandable. It considers that teaching history in the school context has a set of conditions (e.g., cognitive) external to history studies and influences how students learn. There can be various ways in which they can be systematised and structured in order. It may be based on cognitive expectations or on logical and rational orders. The hierarchical classification of cognitive learning objectives is based on the concept developed by Benjamin S. Bloom in 1956. Bloom created six interdependent levels that specify the sequence and method of learners' cognitive actions (Vajda, 2018, p. 100).

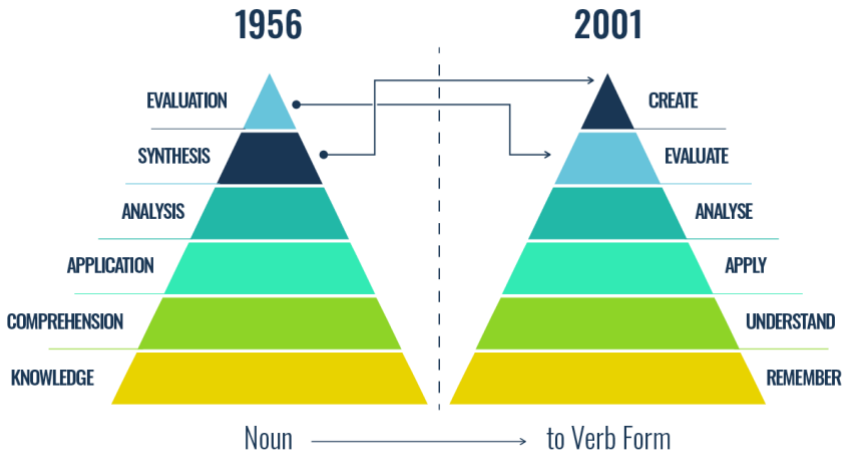


Fig. 1: Bloom's taxonomy (left) and the revised Bloom taxonomy (right)

Source: https://www.growthengineering.co.uk/wp-content/uploads/2022/03/BloomsTax-Update-diagram-2-02.png

The left side of Figure 1 shows the taxonomy created by Bloom in 1956, while the right side of Figure 1 shows the taxonomy revised in 2001 by a research group led by Bloom's colleague David Krathwohl and one of Bloom's students, Lorin Anderson.

2 Defining the Aim of The Research

Our research aims to map what type of cognitive activity the tasks in the selected chapters of the textbooks under study promote and what skill areas they develop. Our research focuses on the era of Dualism; therefore, we will examine issues related to this topic in both Hungarian elementary school history textbooks used in Slovakia and elementary school history textbooks used in Hungary. The following two textbooks are currently in use in Slovakia and Hungary, respectively:

- Bednárová, M., Krasnovský, B., & Ulrichová, B. (2011): *Történelem az alapiskolák 8. és a nyolcosztályos gimnázium 3. osztálya számára*. Vydavateľstvo Matice slovenskej s. r. o., ISBN 978 80 8115 046 3
- Tóth, A. (2020): *Történelem 7. az általános iskolások számára*. Oktatási Hivatal. ISBN 978 963 436 2302.

3 A Brief Introduction to the Textbooks

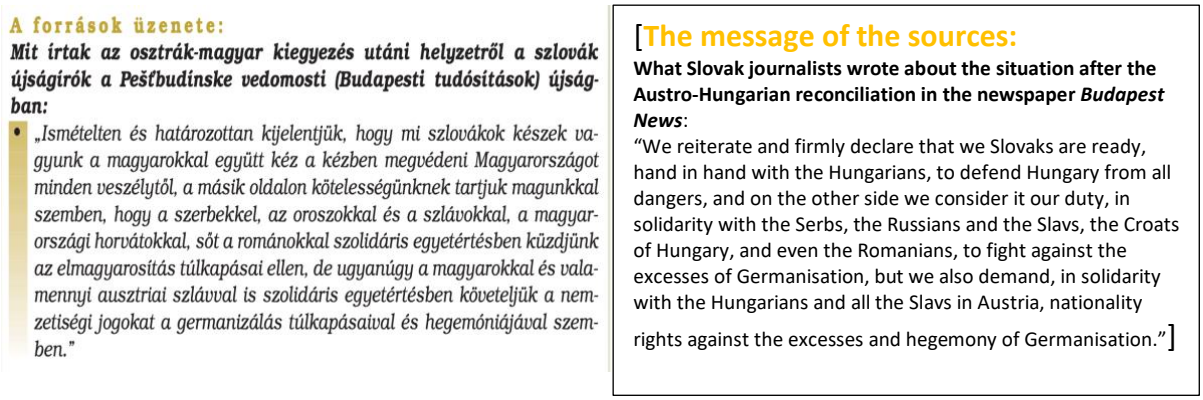
The first step is to examine the structure of the textbooks. After that, we will only deal with the chapter that discusses the era of Dualism, and within that, only with the questions related to it; that is to say, nothing else will be examined within the scope of this paper.

The two textbooks mentioned are of different length. The 8th grade textbook used in Slovakia is 90 pages (without cover, a concise encyclopedia, resources and table of contents). Hungary's textbook used in 7th grade is 234 pages (also without cover, table of contents, sources and a concise encyclopedia). According to pedagogical documents, the era of Dualism is taught in the eighth grade in Slovakia and the seventh grade in Hungary.
In the case of Slovakia, the chapter on Dualism is titled "*The Austro-Hungarian Monarchy*' and is ten pages long in its totality. In comparison, in the case of Hungary, the chapter is titled "*The "Era of Dualism*" and is twenty pages long, not counting the first and the last pages of the chapter, which only show one picture each.

In the case of Slovakia, no information was found on the number of hours recommended for processing the topic. In contrast, in the case of Hungary, it is 7 hours, as described in the framework curriculum.

4 Aspects of the Examination of Questions and Tasks

We do not consider a question or a task sentence that begins with an interrogative word but does not have a question mark at the end and is answered. E.g., "What the Slovak journalists wrote about the situation after the Austro-Hungarian agreement in the newspaper *Budapesti tudosítások* [Budapest News]". See Figure 2.



A források üzenete:

Mit írtak az osztrák-magyar kiegyezés utáni helyzetről a szlovák újságírók a Pešťbudínske vedomosti (Budapesti tudósítások) újságban:

• „Ismételten és határozottan kijelentjük, hogy mi szlovákok készek vagyunk a magyarokkal együtt kéz a kézben megvédeni Magyarországot minden veszélytől, a másik oldalon kötelességünknek tartjuk magunkkal szemben, hogy a szerbekkel, az oroszokkal és a szlávokkal, a magyarországi horvátokkal, sőt a románokkal szolidáris egyetértésben küzdjünk az elmagyarosítás túlkapásai ellen, de ugyanúgy a magyarokkal és valamennyi ausztriai szlávval is szolidáris egyetértésben követeljük a nemzetiségi jogokat a germanizálás túlkapásaival és hegemóniájával szemben."

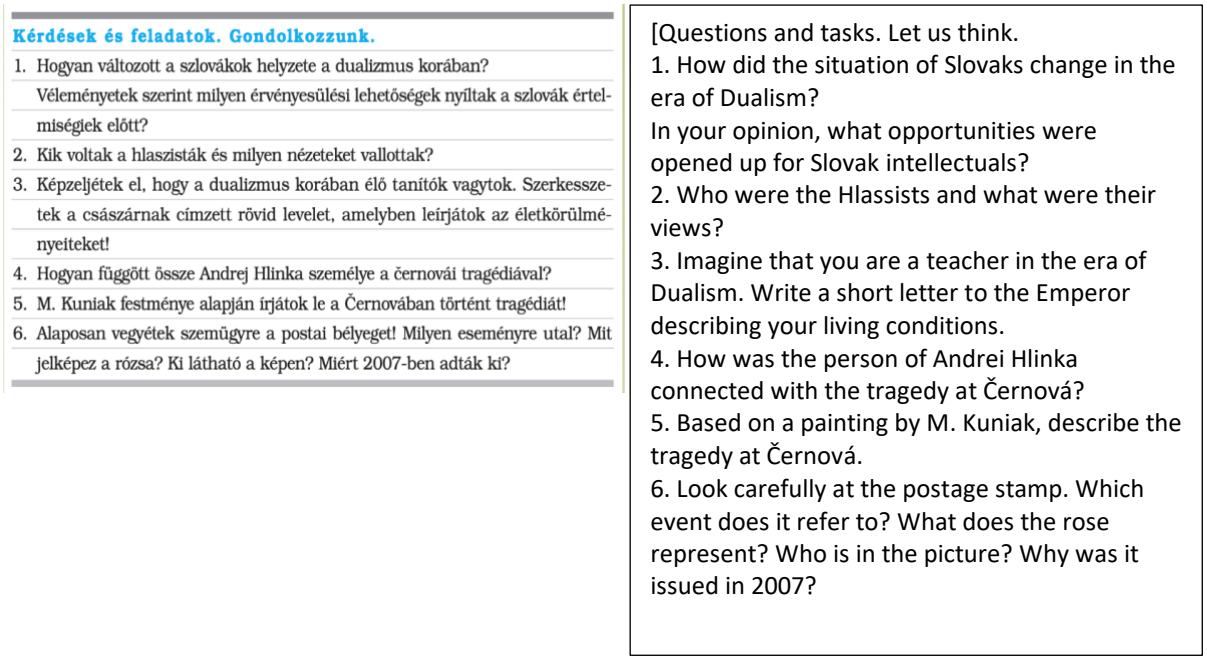
[The message of the sources:

What Slovak journalists wrote about the situation after the Austro-Hungarian reconciliation in the newspaper *Budapest News*:

"We reiterate and firmly declare that we Slovaks are ready, hand in hand with the Hungarians, to defend Hungary from all dangers, and on the other side we consider it our duty, in solidarity with the Serbs, the Russians and the Slavs, the Croats of Hungary, and even the Romanians, to fight against the excesses of Germanisation, but we also demand, in solidarity with the Hungarians and all the Slavs in Austria, nationality rights against the excesses and hegemony of Germanisation."]

Fig. 2: Bednárová, Marcela – Krasnovský, Branislaw – Ulrichová, Barbora (2011): Történelem az alapiskolák 8. és a nyolcosztályos gimnázium 3. osztálya számára, p. 64. (Translated by the author of the present paper.)

If several instructions (questions and tasks are mixed) within an item (question or part), it is counted for as many items as there are instructions. In question 6, shown in Figure 3, for example, there is one instruction (task) and four questions, which is counted as five items.



Kérdések és feladatok. Gondolkozzunk.

1. Hogyan változott a szlovákok helyzete a dualizmus korában?
   Vélemények szerint milyen érvényesülési lehetőségek nyíltak a szlovák értelmiségiek előtt?
2. Kik voltak a hlaszisták és milyen nézeteket vallottak?
3. Képzeljétek el, hogy a dualizmus korában élő tanítók vagytok. Szerkesszetek a császárnak címzett rövid levelet, amelyben leírjátok az életkörülményeiteket!
4. Hogyan függött össze Andrej Hlinka személye a černovái tragédiával?
5. M. Kuniak festménye alapján írjátok le a Černovában történt tragédiát!
6. Alaposan vegyétek szemügyre a postai bélyeget! Milyen eseményre utal? Mit jelképez a rózsa? Ki látható a képen? Miért 2007-ben adták ki?

[Questions and tasks. Let us think.
1. How did the situation of Slovaks change in the era of Dualism?
In your opinion, what opportunities were opened up for Slovak intellectuals?
2. Who were the Hlassists and what were their views?
3. Imagine that you are a teacher in the era of Dualism. Write a short letter to the Emperor describing your living conditions.
4. How was the person of Andrei Hlinka connected with the tragedy at Černová?
5. Based on a painting by M. Kuniak, describe the tragedy at Černová.
6. Look carefully at the postage stamp. Which event does it refer to? What does the rose represent? Who is in the picture? Why was it issued in 2007?

Fig. 3: Bednárová, Marcela – Krasnovský, Branislaw – Ulrichová, Barbora (2011): Történelem az alapiskolák 8. és a nyolcosztályos gimnázium 3. osztálya számára, p. 68.

If an instruction looks like a task but is one or more questions, it is considered to be a question or question. See Figure 4. Although the instruction says "*Determine*", it is clear that this instruction contains two questions: "What do the Slovaks want to defend themselves against?" and "Why are they willing to fight?".

Megfejtjük a forrásokat:

❖ Tanulmányozzátok a részletet!
❖ Állapítsátok meg, mi ellen akarnak a szlovákok védekezni és miért hajlandók küzdeni!

[**We decipher the sources:**
❖ Study the details!
❖ Find out what the Slovaks want to defend themselves against and why they are willing to fight!]

Fig. 4: Bednárová, Marcela – Krasnovský, Branislaw – Ulrichová, Barbora (2011): Történelem az alapiskolák 8. és a nyolcosztályos gimnázium 3. osztálya számára, p. 64.

If an instruction is a question, but the answer is not given in the textbook, it is considered a task. E.g., "Do research and find out what railway lines were ready in 1848." (Tóth, Attila (2020): Történelem 7 az általános iskolások számára, p. 33.) Questions containing the instruction words "List", "Name", and "Fill in" clearly link the tasks to Bloom's Level 1, the level of factual knowledge (Vajda, 2020, p. 30). Some verbs can be assigned to several levels, but the definitions given in Table 1 serve as the basis for our investigation.

The levels of Bloom's taxonomy:	Examples of verbs related to levels:
Level 1: level of factual knowledge (remember)	define, list, describe, name
Level 2: Level of understanding (understand)	interpret, describe, explain, identify
Level 3: Level of action/use (apply)	apply, use, select, depict, outline
Level 4: Level of analysis (analyse)	analyse, divide, calculate, compare, differentiate
Level 5: Level of summarisation (synthesise)	arrange, collect, assemble, present, create, plan, propose, summarise
Level 6: Level of evaluative judgement (evaluate)	evaluate, argue, summarise, judge

Table 1: Sit Bloom's Taxonomy Levels and Related Action Verbs (Vajda, 2018, p. 101)

5 Results of the Examination of the Questions and Tasks

Of the 56 items in the examined chapter of the Hungarian textbook used in Slovakia, 22 correspond to Level 1 of Bloom's taxonomy, 12 to Level 2, 6 to Level 3, 7 to Level 4, 5 to Level 5, and 4 to Level 6. The results are presented in Figure 5.

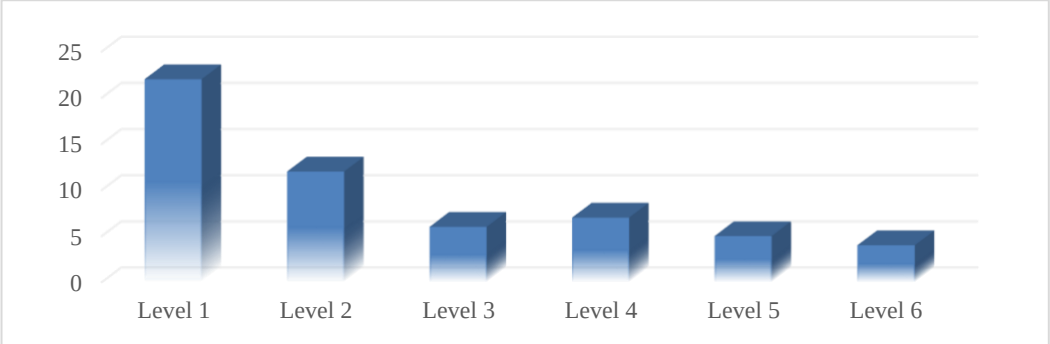


Fig. 5: Results of the question and task analysis according to the levels of Bloom's taxonomy in the history textbook used in Slovakia.

Of the 178 items in the examined chapter of the textbook used in Hungary, 93 corresponded to Level 1 of Bloom's taxonomy, 40 to Level 2, 26 to Level 3, 13 to Level 4, 5 to Level 5, and 1 to Level. The results are presented in Figure 6.

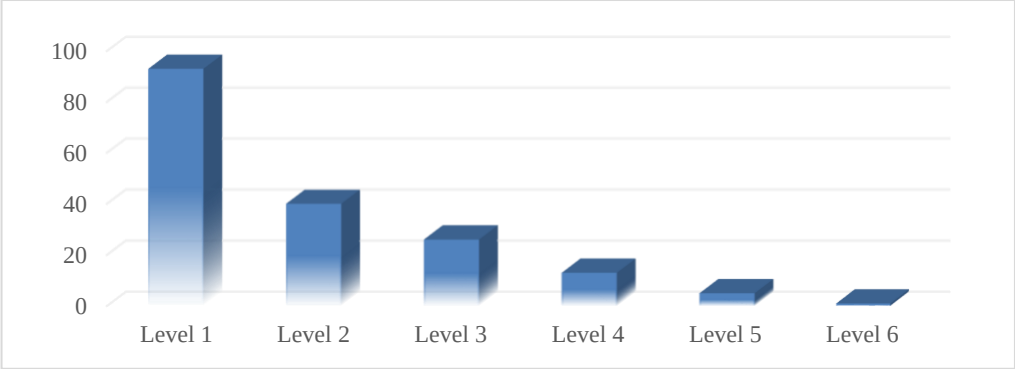


Fig. 6: Results of the question and task analysis according to the levels of Bloom's taxonomy in the history textbook used in Hungary.

The percentage distribution of the items in the two textbooks is shown in Figure 7. We can see that 39% of all items in the examined chapter of the Hungarian textbook used in Slovakia correspond to Level 1 of Bloom's taxonomy. In comparison, this number is higher (52%) for the examined textbook chapter used in Hungary. The percentage distribution of items corresponding to Level 2 of Bloom's taxonomy is almost the same: 21% for the Hungarian textbook used in Slovakia and 22% for the textbook used in Hungary. The percentages are 11% and 15% for Level 3, 13% and 7% for Level 4, and 9% and 3% for Level 5. 4 items for Level 6 of Bloom's taxonomy were found in the examined chapter of the Hungarian textbook used in Slovakia (7%). Only one item for Level 6 of Bloom's taxonomy was found in the textbook used in Hungary (1%).

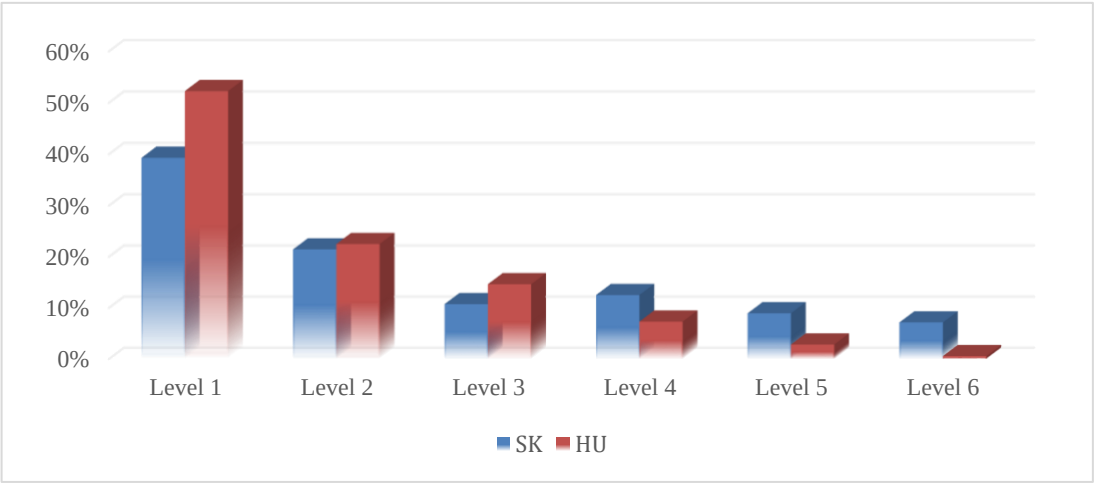


Fig. 7: Percentage distribution of the questions and tasks analysed according to the levels of Bloom's taxonomy in the history textbook used in Slovakia (blue) and in Hungary (red).

		Page:	1	2	3	4	5	6	7	8	9	10	
SK	Revision	Questions	2	0	0	0	2	0	0	3	0	0	7
		Tasks	0	0	0	0	0	0	0	0	0	0	0
	In-chapter	Questions	2	0	2	0	0	0	0	0	0	0	4
		Tasks	0	0	1	0	0	0	0	0	0	0	1
	Synthesis	Questions	0	0	0	5	0	0	11	0	0	9	25
		Tasks	0	0	0	5	0	0	8	0	0	4	17
		Project-based tasks	0	0	0	0	0	0	1	0	0	1	2
	Total:		4	0	3	10	2	0	20	3	0	14	56

Table 2: Detailed results of the questions and tasks analysed in the history textbook used in Slovakia.

The chapter dealing with the era of Dualism (pages 62–71) of the Hungarian history textbook for eighth graders in Slovakia contains 56 questions and tasks on ten pages. The questions and tasks have been grouped according to whether they aim at checking or revising existing knowledge (revision), at processing new course material (in-chapter), or at organising and synthesising the knowledge already acquired (synthesis). The results of the research are presented in Table 2.

Table 2 shows that out of the 56 questions and tasks, seven were for revision, 5 related to the given chapter, and 44 were aimed at synthesising. It can be stated that there were an average of 5.6 tasks/questions per page. The chapter on the era of Dualism (pages 30–49) of the seventh-grade history textbook used in Hungary contains a total of 178 questions and tasks on 20 pages.

		Page:	1	2	3	4	5	6	7	8	9	10	
HU	Revision	Questions	0	1	0	0	0	1	0	0	0	4	6
		Tasks	1	1	1	0	0	0	1	0	0	0	4
	In-chapter	Questions	6	1	1	4	4	3	1	1	3	3	27
		Tasks	1	2	2	2	7	2	2	3	2	4	27
	Synthesis	Questions	0	0	0	0	0	0	0	0	5	0	5
		Tasks	0	0	0	0	0	0	0	0	1	0	1
		Project-based tasks	0	0	0	0	0	0	0	0	0	0	0
	Total:		8	5	4	6	11	6	4	4	11	11	70

		Page:	11	12	13	14	15	16	17	18	19	20	
HU	Revision	Questions	2	0	0	0	1	1	0	0	2	0	6
		Tasks	0	0	0	0	0	0	0	0	0	0	0
	In-chapter	Questions	6	0	0	8	4	2	3	3	4	0	30
		Tasks	0	8	4	3	6	4	5	1	2	0	33
	Synthesis	Questions	0	0	0	0	0	0	0	7	0	22	29
		Tasks	0	0	0	0	0	0	0	2	0	8	10
		Project-based tasks	0	0	0	0	0	0	0	0	0	0	0
	Total:		8	8	4	11	11	7	8	13	8	30	108

Table 3: Detailed results of the questions and tasks analysed in the history textbook used in Hungary.

The grouping of questions and tasks was carried out here as described above. The results of the research are presented in Table 3.

Table 3 shows that of the 178 questions and tasks, 16 were for revision, 117 were related to the given chapter, and 45 were synthesis ones. It can be stated that there was an average of 8.9 tasks/questions per page.

6 Conclusion

In respect of the classification according to Bloom's taxonomy, it can be stated that the number of items in the examined chapter of the textbook used in Hungary is higher for four Bloom levels (Level 1-4) than the number of items in the examined chapter of the Hungarian textbook used in Slovakia. It is worth mentioning that only one item was found for Level 6 in Bloom's taxonomy in the Hungarian textbook, and four items found for Level 6 of Bloom's taxonomy were found in the examined chapter of the Hungarian textbook used in Slovakia. The results are presented in Figure 8.

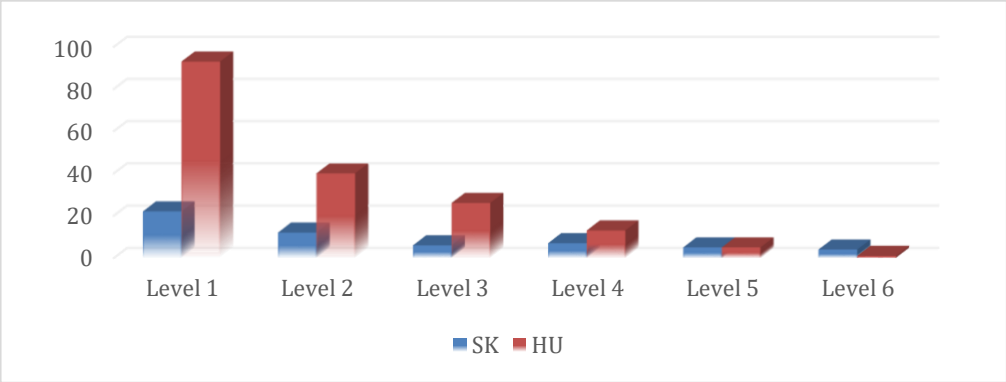


Fig. 8: Number of the questions and tasks analysed according to the levels of Bloom's taxonomy in the history textbook used in Slovakia (blue) and in Hungary (red).

As the result of our study, we established that the two countries discuss the era of Dualism in different grade levels. While the relevant topic is part of the core material of the 7th grade in Hungary, in Slovakia, it is discussed by students in the 8th grade. In addition to the grade, we also found a difference in the length of the textbook since the era of Dualism is 10 pages in the Hungarian textbook in Slovakia. In comparison, the same chapter in the Hungarian textbook is 20 pages long, i.e. double the length of the Hungarian textbook of the Slovak textbook. In this context, it should be mentioned that in Hungary, the number of mandatory hours per week of classes in history is 2, while in Slovakia, this number is only 1 in the examined grade.

A discrepancy was also found between the number of questions and answers in the relevant chapters. There are 56 questions and tasks (items) in the chapter on Dualism in the eighth-grade history textbook in Hungarian used in Slovakia. This represents an average of 5.6 items per page. In the case of the coursebook chapter taught in Hungary, the number of items is

178, and the average number of items per page is 8.9. In this respect, it can be concluded that more tasks are included in the textbook used in Hungary.

The items in the chapters under study were also categorised according to whether they aim at checking or revising existing knowledge (revision), processing new course material (in-chapter) or organising and synthesising the knowledge already acquired (synthesis). The data are presented in Figure 9.

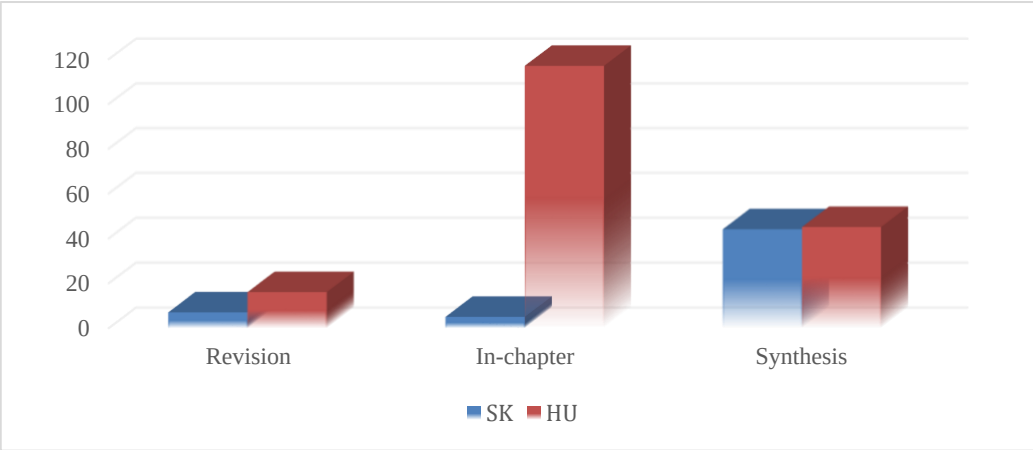


Fig. 9: Result of the analysis according to the function of questions and tasks

The chapter on the era of Dualism in the Hungarian-language eighth-grade history textbook used in Slovakia contains seven revision items, five in-chapter items, and 44 synthesising items. In contrast, in the case of the textbook used in Hungary, there are 16 items for revision, 117 in-chapter items, and 45 for synthesis. It can be noticed that although the total number of items is much higher in the textbook used in Hungary, the number of items for synthesis is nevertheless almost the same. The most significant difference was found in the case of items within the chapters. From this, it can be concluded that the Slovak history textbook provides little space for deepening, memorising, and applying what has been learned during the teaching of the period of Dualism, making it less possible to deepen and develop actual knowledge.

References

Ábrahám, I. (1993). A tankönyv funkciói, szerkezeti elemei. Tankönyvműfajok. In: *Kiadói ismeretek. Útmutató tankönyvszerzők és -szerkesztők számára*. Korona Kiadó, Budapest.

Bruillard, E. (2021). *Manuals scolaries : recherches et pratiques actuelles, quelques repères*. https://gis-2if.shs.parisdescartes.fr

Collins Dictionary. Definition of “textbook”. https://www.collinsdictionary.com

Engel, E., & Vajda, B. (2021). On the didactical aspects of images as sources and illustrations – based on research of some Slovakian elementary history schoolbooks. *Belvedere Meridionale* 2021. *XXXIII.*, (02), pp. 133–151.

F. Dárdai, Á. (1995). Tankönyvelemzési modellek a nemzetközi tankönyvkutatásban. *Iskolakultúra*, *9* (4), 44–53. http://www.iskolakultura.hu/index.php/iskolakultura/article/view/19040

Hummel, C. (1988). *School textbooks and lifelong education: An analysis of schoolbooks from three countries.* Humburg: UNESCO Institute of Education.

Karlovitz, J. (1988). *A tankönyvelméleti kutatás kezdeti eredményei*. Módszertani közlemények, *28* (5). pp. 334–336.

Karlovitz, J. (2000). *Tankönyvi, tankönyvelméleti alapfogalmak*. Könyv és Nevelés, 2000/2.

Karlovitz, J. (2001). *Tankönyvtípusok, tankönyvmodellek*. Új Pedagógiai szemle, January 2001, pp. 80–88.

Magyar Pedagógia Lexikon, Vol.2. (1934). Edited by Kemény Ferenc, Fináczy Ernő and Kornis Gyula). *Magyar Pedagógiai Társaság*, Révai Irodalmi Intézet, Budapest.

Marsden, W. E. (2001). *The school textbook: Geography, history and social studies*. London: Woburn Press.

Schüttler, T. (2003). Mire jó a tankönyvelmélet? Karlovitz János tankönyvelméleti könyvéről. *Új Pedagógiai Szemle*, September 2003.

Simon, S. (2017). A szlovákiai magyar oktatáspolitikai helyzet és a hazai tankönyv- és tantervkutatás újabb eredményeihez. In Lőrincz, J., & Simon, Sz. (eds.). A tankönyvkutatás szakmai, módszertani kérdései. Selye János Egyetem, Komárom.

Tóth, P. (2017). Beregszászi Pál rajzkönyve a történeti tankönyvkutatás fókuszában. In Lőrincz, J., & Simon, Sz. (eds.). *A tankönyvkutatás szakmai, módszertani kérdései*. Selye János Egyetem, Komárom.

Vajda, B. (2020). *History Didactics and Research of History Schoolbooks*. J. Selye University, Komárno.

Volk und Wissen Verlag (1967). A tankönyv funkciója és szerkesztése. A Volk und Wissen Verlag téziseiből. In: Illés Lajosné–Horváth György (eds.). *A pedagógia időszerű kérdései külföldön. A korszerű tankönyv*. Tankönyvkiadó, Budapest.

Developing Information Literacy

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DOI: https://doi.org/10.53349/resource.2023.is1.a1201

Abstract

Currently, due to changes in Slovak Education we increasingly often meet with the concept of competences, key competences. We tend to speak about key competences as a new phenomenon in education. The term originates from the 1970s in economics where it represented a set of specific requirements for the job seeker. It was transferred to the field of education in the late 90s where it serves as a bridge between the requirements imposed by employers in the labour market and the graduate's profile. The term competence is used both in professional and common language; and ability, skill, capability, effectiveness, capacity, desired quality and others are used as synonyms for the group of terms. A person who has the abilities and skills, motivation, knowledge, etc., to carry out tasks well in a particular field is considered competent. Competence is usually applied to individuals, social groups and institutions in case they successfully fulfil requirements and achieve goals set by their environment. The theory of key competences has not yet been completely formulated and neither does a comprehensive and widely accepted definition exist. This paper will focus on information literacy and developing competencies in the information society as one of the necessary key competencies.

Keywords: Different learning, Teaching of module system, Information society, Information literacy

1 Introduction

According to Hrmo, "Key competences are a set of interiorised, interconnected groups of acquired knowledge, skills, abilities, attitudes and valuing approaches, which are important

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for the qualitative personal development of the individual, his/her active participation in society, application in employment and lifelong learning" (Hrmo, 2003).
Another definition states:

> "Having competence means having complex equipment of personality, which allows the individual to successfully address challenges and situations in life, in which one can adequately orient, take appropriate actions and take a beneficial attitude. Key competences need to allow the individual to refresh the skills and knowledge applicable in everyday life continuously. For a person in training not all educational activities (cognitive, training, and educative) need to be beneficial, but especially those, which are useful in standard practice, provide quality education and correspond with company requirements in the labour market. The attended educative process or certificate of the attended educative process is crucial, as are the learning outcomes."

2 The Concept of the Information Society

Information society from the point of view of an ordinary person, is a society where the work with information is an everyday activity. Some different information and communication technologies (ICT) are used to work with information means the methods, procedures and means such as computers, electronic diaries, mobile phones and so on.
From a social point of view, an information society is a society in which informatics and information and communication technologies are becoming an economic force, identifying, and transforming the entire social system and acting as a means of creating new social, superclass and supranational structures fundamentally altering the mechanisms of social development.
Challenges of the information society and further development directions have been the subject of several papers at the international and national level. The following ones have an important role within the frame of documents of national character:

- Policy of Information Society in the Slovak Republic for 2015 – 2018 with a view to 2025.
- National Action Programme of Society Informatization
- Millennium – National Programme of Education in the Slovak Republic for the next 15 to 20 years (10-13).

The main benefits of the information society are:

- making available the usage of information sources and their tools by the general public,
- expansion and improvement of means of services and entertainment,
- promotion of education,

- new opportunities for the application of human creative abilities, as well as the employing of handicapped people in life through “teleworking”
- increasing cultural traditions and identity of regions,
- more efficient state administration,
- more effective management of enterprises, improving competitiveness, facilitating of connection between the manufacturer, service provider and the customers themselves,
- new services in telecommunications and new markets in the field of software,
- more effective health care (Kissné Zsámboki, 2021).

Information Society was first taught at J. Selye University in the winter semester of 2020/2021. Since the subject of Information Society was not included in the accredited programs, the content of the course was divided into several subjects. Most of the topics were included in the basic subject of Information and Communication Technologies, taught in the first years of education at the Faculty of Education of J. Selye University. Part of the topics appears in the continuing subject of Information and Communication Technologies II. The subject of Informatics is taught only one semester at the Faculty of Education so only four modules of Information Society are taught by means of presentations. Individual modules were evaluated based on tests which had to be passed by all the students as the procedure within the exam. Tests were carried out in the Moodle environment where the teacher could precisely evaluate the different parts and process the percentage of success. Thematic unit on e-learning has found its place in the subject Didactics of Informatics, which is an organic part of the Master Teacher Training program. Thematic unit on legal standards of information society forms a part of the subject called Law and Ethics s in the Use of Information and Communication Technologies.

2.1 Course: Developing Information Literacy

Our previous experience of working with students and executing subjects in the first years, shows that students come to college with ever-improving skills in ICT. Not always, however, are these skills sufficiently comprehensive and are usually associated only with general information literacy. We aim to develop these skills in students and shape subject information literacy (Ugrai, 2020).

The course will take the form of e-learning as part of the subject Information Society. Since we believe it is necessary to convey to students the following information as soon as possible, we have chosen Information Society as a reference subject due to its concentration on first-year students in the faculty of education.

The course is made up of five modules, each of them containing two chapters. Modules used as a proposal for teaching e-learning courses have specifically defined instructions for studying, introduction, module objectives, content and performance standards, instructional

text, summary, auto-test, additional literature, conclusions, and bibliographical references (Szőköl, 2015).

Individual modules are completed with a self-test summarising the discussed curriculum. After successfully completing this test, students can advance to the next module. At any time, frame of the program, students can use electronic consultations (Marks & Lajčn, 2017).

The study support of each module is divided and structured so that the acquisition of knowledge and the creation of knowledge by the study participants work with maximum efficiency. Efficiency lies mainly in the fact that the study participants can fully engage in the study of the educational content because it is not constrained by directed learning, as the study text includes features allowing rapid and accurate autoregulation. Participants in the study, after applying for the subject (course) receive the study materials.

2.2 The Necessity of Realization of the Modular System of Education

Quality is the measure of the perfection, preciousness, and usefulness of education and learning, fulfilling of requirements and expectations of the school's clients: pupils, students, parents, employees, and citizens of the country. The quality of education is able to rise continuously without consideration of the actual level (Pavlov, 2018).

Internally the subject informatics at the university is possible to reach only modularly, so all students can study only what they do not know. Different kinds of secondary schools have different standards which students have to reach. There are significant differences between the students, who are applying to universities from the area of informatics, which affect the competence and practical abilities from the enfaced area. Wherever in this area are existing standards, which influence the level of information ability of the senior, in most cases, the knowledge of the students, which are starting the first year at the university, are not reaching this standard. The reasons for these imperfections are different (Porubčanová, 2018). One of the reasons could be the kind of secondary school, as the level of teaching information and communication technology (ICT). The next reason for the big difference is that not all of the students have a connection to these disciplines, and many students are missing motivation. The first two reasons we can classify as external conditions of education, which are closely connected with the school's preparedness, which is concerned with the tooling of material-technology basics and preparedness of the students. The material and technology tooling of education is the question of finance, and in a short time, it could be changed from the nought to above the average. With the preparedness of the students, it is not so easy. It could be possible that the different knowledge of the students coming to universities will be a problem for a long time. That is why it could be a good solution to the modular system of education informatics – teach somebody, what he does not know with the help of a cloak test.

To ensure of informational knowledge on single levels, the educational programs contain basic and subjects oriented toward computing, informatics and information communication technologies.

3 Results and Discussion

The questionnaire included four teacher competences closely related to the internationalisation of education: *communication in foreign languages, digital competence, interaction skills* and *cooperative skills*. The averages for each listed competence were calculated from the questionnaire. We can conclude that none of the listed competences reached worse than the 3 points average, meaning that the respondents consider them at least essential or higher.

Communication in foreign languages is based on the ability to understand, express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form in an appropriate range of societal and cultural contexts (in education and training, work, home and leisure) according to needs. Competence in foreign languages requires knowledge of vocabulary and functional grammar and an awareness of the main types of verbal interaction and language registers. Knowledge of societal conventions, the cultural aspect, and the variability of languages is important. Essential skills for communication in foreign languages consist of understanding spoken messages, initiating, sustaining, and concluding conversations, and reading, understanding, and producing texts appropriate to the individual's needs. A positive attitude involves an appreciation of cultural diversity and an interest and curiosity in languages and intercultural communication. European Communities (2007)

Digital competence involves the confident and critical use of IST (Information Society Technology) for work, leisure and communication. Basic skills in ICT underpin it: the use of computers to retrieve, assess, store, produce, present and exchange information and to communicate and participate in collaborative networks via the Internet European Communities (2007). Digital competence is closely linked with technology skills. The use of ICT in teaching is also a particular technological process. This includes a variety of technical devices used alone or in combination with other teaching aids. Using ICT can easily and quickly connect with people from abroad, and so consult with experts or obtain new information to learn. However, the information is mostly not available in the national language.

Interaction skills are a part of interpersonal skills. Interpersonal interaction is a communication process that involves the exchange of information, feelings and meaning using verbal and non-verbal messages between two or more persons (teacher and children or teacher and others). Children learn and develop by interacting with teachers, each other's families and other people. Adults who are respectful listeners and keen observers prepared to negotiate, change their practice, and make meaning with children are most responsive to them. They know the children well, are sensitive to their current level of understanding, know

their interests and intentions, and pitch activities and experiences that are just beyond what they can currently do and understand to extend their learning. Their interactions promote children's learning and development and help them reach their full potential. (2)

Cooperative skills are a skill set everyone needs to cooperate effectively – i.e. work with others in a collective, non-hierarchical, democratically managed organisational structure. The cooperating teacher has the most significant and longest-lasting influence on the student teaching experience and the aspiring teacher's growth and development long after student teaching has ended. (1)

In our research of all monitored key competences, teacher competences, skills, knowledge and other attitudes, communication in the mother tongue reached the highest preference. Similarly, it was ranked first in the competence survey provided by Szőköl (2016) conducted by practicing teachers in Hungary. Overall, we found that our results and results by Szőköl (2016) regarding the most preferred teaching competences are very similar.

Only three competences reached the average value of 4.5 points: communication in the mother tongue, ability to take responsibility and expertise. Similarly, interaction and cooperative skills also got high scores in our questionnaire (Tab. 1).

However, our survey's lowest value (3.21 points) was achieved by mathematical competence and basic competences in science and technology – even though this competence also belongs to key competences. Although the preference for digital competence is higher than mathematical competence and basic competences in science and technology, but it is also very low, on the 33rd place in the ranking of all forty observed key competences, teacher competences, skills, knowledge and other attitudes. In the list of eighteen competences published by Bendíková (2014) digital competence is ranked on 16th place with 3.65 points.

A basic statistical evaluation of four selected teacher competences of the research is presented in Table 1.

Key competences, teacher competences, skills, knowledge and other attitudes	**Maximum**	**Minimum**	**Range**	**Modus**	**Arithmetical average**	**Variance**	**Standard deviation**	**Median**
Communication in foreign languages	5	2	3	4	3.73	0,70	0,84	4
Digital competence	5	2	3	3	**3.56**	0.62	0.79	3.5
Interaction skills	5	2	3	**5**	**4.41**	0.52	0.72	5
Cooperative skills	5	2	3	**5**	4.31	0.54	0.73	4
Sample size	**5**	**2**	**3**	**4**	**4.0025**	**0.595**	**0.77**	**4.125**

Tab. 1: Statistics on four selected teacher competences

Key competences, teacher competences, skills, knowledge and other attitudes	**Maximum**	**Minimum**	**Range**	**Modus**	**Arithmetical average**	**Variance**	**Standard deviation**	**Median**

Sample size: **40**	**4.58**	**3.21**	**1.37**	**4.2**	**3.90**	**0.14**	**0.37**	**3.875**

Tab. 1: Statistics on four selected teacher competences

Key competences, teacher competences, skills, knowledge and other attitudes	**Answers**				
	1 Unnecessary %	**2 Less necessary %**	**3 Important %**	**4 Very important %**	**5 Indispensable %**
Communication in foreign languages	0.00	7.50	30.00	**45.00**	17.50
Digital competence	0.00	6.25	**43.75**	37.50	12.50
Interaction skills	0.00	1.25	10.00	35.00	**53.75**
Cooperative skills	0.00	1.25	12.50	40.00	**46.25**

Tab. 3: Preference of four selected teacher competences

Table 3 shows the distribution of response preferences of the four selected teacher competences.

The reasons why should occur internationalisation and modernisation of teacher training programmes: Students obtain updated information and knowledge and are not burdened with data and knowledge not essential to their future life. Graduates succeed in today's world and be competitive in the labour market; be not only educated but also confident and independent; become able to work creatively and solve unforeseen situations but also to cooperate with others regardless of whether it is a fellow citizen or foreign.

4 Conclusion

Knowledge is only the basis of preferred core competencies of the individual and may not be sufficiently beneficial for individuals, even if they were associated with other components of competences. Acquiring key competencies is a life-long process. For these competencies to be developed qualitatively, we must achieve a quality education system.

In applying for an e-learning course, the process of initial motivation, the evaluation and classification of individual modules, and the process of exposure to the new curriculum are bound to be dealt with.

For teachers to lead their students to the use of the Internet in the learning process, they need to gain computer and information literacy, which means that they will get to know, understand and be able to explain the basic concepts of information technology, the use of a personal computer (PC) and work with data sets, work with a PC's word processor, create and work with tables, charts, figures, create and work with a PC's databases, create presentations, obtain information and communicate via the PC, i.e., to operate with the internet, create web pages, and handle e-mails.

Concerning that the transformation of the subject system of teaching to a modular system of teaching belongs to the most actual themes in the university system, the main benefits will be:

- Working out a modular system of teaching informatics in the theoretical field, as in practical realisation too.
- With the survey, we have found that the launch of the modular teaching system is reachable with individualisation of preparing students in big quantities and finally rationalisation of the teacher's work and reach higher affectivity of the teaching process.
- Launching the modular structure of content and adaptive method of teaching the subject of informatics will save the needed number of contact hours of the teaching hours. It follows that the requirements for the classroom technique will be fewer.
- The chance to use the teaching method "learning by doing" as the compensation absolving the contact hour.
- The number of needed direct teaching hours will be decreased by 38%. Single thematic wholes probably will have different replacements in the time plan of the teaching process.

In the validation process of the modular teaching system, it is necessary to work with the process of cloak motivation, the process of rating and classification of single modules with the process of exposition of the new tutorial, and the process of defining the homework.
At the beginning of the semester, we need to find out the level of the student's knowledge in the first class on the Faculty of Education of UJS in informatics. We need to find out their requirement and their preferred learning style.

References

Bendiková, E. (2014). Lifestyle, physical and sports education and health benefits of physical activity. *In European researcher: international multidisciplinary journal. Sochi: Academic publishing house Researcher*, *69* (2-2), pp. 343-348. ISSN 2219-8229.

Bendíková, E. (2020). Diversification of the physical and sport education syllabi and its effects on the musculoskeletal system in young female students. *Trends in Sport Science*, 2020, *27* (3): 149-155. https://doi.org/j56t

Benedek, A. (2015). Visuality as a tool for expanding learning. In: António Moreira Teixeira, András Szűcs, Idikó Mázár (szerk.), *2015 Annual Conference*. Barcelona: European Distance and E-Learning Network (EDEN). pp. 3–8. ISBN:978-615-5511-03-5.

Belz, H., & Siegriest, M. 2001. *Klíčové kompetence a jejich rozvíjení*. Praha: Portál 2001, 375 p.

Bilcik, A. (2018). Podpora záujmu žiakov a ich spokojnosti s vyučovaním na stredných školách. In Berková, K, Krpálková Krelová, K. (editors). SCHOLA NOVA, QUO VADIS*? Sborník recenzovaných příspěvků 3. ročníku mezinárodní vědecké conference, Reviewed Papers of the 3rd International Scientific Conference*. Praha: Extrasystem Praha, 2018. pp. 31-36. ISBN 978-80-87570-40-1.

Hrmo, R. & Turek, I. (2003). *Kľúčové kompetencie 1*. Bratislava: STU, 2003. ISBN 80- 227-1881-5.

Kissné Zsámboki, R. (2021). Projekt alapú aktív tanulás a kisgyermeknevelésben s az iskolai oktatásban Sopron, Magyarország, *Soproni Egyetemi Kiadó*, 82 pé. ISBN 9789633343838.

Marks, I., & Lajcin, D. (2017). Anton Štefánek a slovenské školstvo v medzivojnovom období – vybrané problémy. Brno: Tribun EU. 119 p. ISBN 978-80-263-1362-5.

Marks, I., & Lajcin, D. (2016). Moderná škola v ponímaní Antona Štefánka. *In Paidagogos: časopis pro pedagogiku v souvislostech*, roč. 2016, *2* (2016), p. 125 – 140. ISSN 1213-3809.

Pavlov, I. (2018). Poradenstvo v podpore profesijného rozvoja pedagogických zborov škôl = Guidance in support of professional development of pedagogical staff at schools. In Orbis scholae : *odborný recenzovaný časopis zaměřený na problematiku školního vzdělávaní v jeho širších sociokultúrních souvislostech* : kurikulární reforma v ČR a SR 10 let poté: bilance a výzvy pro současnou školu. Praha: Univerzita Karlova, Pedagogická fakulta, *12*, (3), p. 31-45. ISSN 1802-4637.

Porubčanová, D. (2018). Analýza rolí profesie vysokoškolského učiteľa. In *Vzdělávání dospělých 2017 – v době rezonujících společenských změn: proceedings of the 7th International Adult Education Conference.* Praha: Česká andragogická společnost. pp. 245-255 [print] ISBN 978-80-906894-2-8.

Szőköl, I. (2016). *Educational evaluation in contemporary schools*. Szeged: Belvedere Meridionale, 159. p., ISBN 978-615-5372-60-5.

Szőköl, I. (2015). Quality management system in the educational process. In Gómez Chova, L., & López Martínez, I., & Candel Torres, I. (eds.): *8th International Conference of Education, Research and Innovation.* Seville (Spain): IATED Academy, pp. 7282–7285. ISBN 978-84-608-2657-6.

Simon, I. Á., Pánger, A., Pataky, O., Vezér, K., & Kövesdi, O. S. (2021). A COVID-19 járvány hatása a gyógytestnevelő tanárok oktató-nevelő munkájára, In: *50. Jubileumi Mozgásbiológiai Konferencia: Program és előadás-kivonatok, Budapest, Magyarország: Testnevelési Egyete,* 65 p. pp. 63-65, 3 p.

Ugrai, J. (2020). Going on Their Own Way. Protestants' Specific Models of Joining the Cultural Elite in 19th-century Hungary. In *Espacio, Tiempo y Educación*, 7, (2), 119-133. http://dx.doi.org/10.14516/ete.243

Key Competences of Students of Professional Subjects Using Activating Methods

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DOI: https://doi.org/10.53349/resource.2023.is1.a1202

Abstract

Nowadays, it is necessary to use not only classic teaching methods be used in the teaching process but also non-traditional methods that can activate students to work independently and to find appropriate solutions to problems. At secondary vocational schools, the basis of students' education is teaching vocational subjects. Graduates of secondary vocational schools are expected not only to have professional knowledge but also the ability to communicate, solve problems independently, work in a team, and orient themselves in information. Therefore, teachers should include as many teaching methods as possible in teaching professional subjects, which will enable students to develop and improve key competencies. Our goal is to describe examples of several specific activating teaching methods that can be applied to teaching various vocational subjects.

Keywords: Key competences, Vocational training, Activating methods

1 Introduction

Key competences, as a new phenomenon in education, represent a mutual connection between upbringing in the family, upbringing and education in the school environment and social influence on human development. Nowadays, the process of general competence development is perceived as a necessary process for applying to the labour market. All member states of the European Union deal with key aspects, at least on a political level. Some countries of the European Union have enabled their citizens to participate in an open project to develop lifelong learning.

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1.1 Definition of Relationships and Basic Terms

In the understanding of the term qualification, there is a consensus in the professional literature. According to Bendíková (2014), by the term qualification, we understand the set of abilities (knowledge, skills, habits, experience) necessary to obtain official competence to perform a particular activity. Another explanation of the term qualification can be found in Hrmo-Turek (2003), who claims that qualification is mediated by external organizational processes, has a substantive orientation, and elements of individual ability to act can be certified. Bendíková (2020) already explained the qualification of an older date, but we can consider his interpretation still current. This is a classic definition of qualification, where qualification is seen as a synthesis of three components – education, experience, and individual characteristics of the worker. In professional literature, the term qualification is often associated with the adjective key. Pavlov (2018) also uses the combination of qualification with the adjective key. They see key qualifications as similar to key competences. As the first concept of key qualifications, Kissné Zsámboki (2021) characterizes them as: "such knowledge, abilities and skills that do not show an immediate and limited relationship to certain diverse practical activities."
He distinguishes four basic forms of key qualifications:

- basic qualifications,
- horizontal qualifications,
- expanding elements,
- acquisition factors.

These forms aim to recognize connections and subsequently manage changes. Mužík (2004) claims that the key qualification includes two elements. On the one hand, it consists of a person's expertise and, at the same time, his ability to transfer this expertise to various professional activities. We can point out that in the professional literature, we often find that the authors' statements often diverge and there is a strict distinction between the two concepts, which can lead to the creation of a distorted picture of the given issue. Having competence according to Hrmo-Turek (2003) means that we can orientate ourselves in the situation appropriately, react adequately and subsequently activate appropriate activity, and adopt a beneficial attitude. Turek (2014) claims that someone who has the knowledge, skills, or motivation to do what is required in the relevant field in a high-quality and efficient manner is considered competent in a certain area. Competence can be understood as the intersection of acquired knowledge, acquired abilities, skills, forming attitudes, value orientation, and motives for action (Turek; 2014).

Competence is the unique ability of a person to act successfully and further develop their potential based on an integrated set of their own resources, in the specific context of various tasks and life situations, combined with the possibility and willingness to make decisions and take responsibility for decisions.

2 Components of Competence

Competence is a relatively stable personality characteristic. If a manager has competence, he can use it in any company and at any management level. Competence tells us how the bearer will behave, think and express himself in certain situations (Porubčanová, 2018). We can divide the individual components of personality that enter into competences:

- Motives
- Traits
- Perception
- Knowledge
- Skills

To properly teach and identify competence from several published procedures, we present only the following:

- determination of the appropriate measure of work performance to identify top workers for the specified position and collect data on the given performance,
- analyse the elements of work behaviour, create a list of characteristic behaviours, balance and analyse the grouping of behavioural manifestations,
- select and use tests to assess competences,
- determine the causal relationship between competences and work performance,
- the result is a validated model.

2.1 The Importance of Key Competences

Key competences are sets of knowledge, skills and attitudes that each individual needs for personal fulfilment and development, for involvement in society and for successful employment. Key competences are the most important of the set of competences, they are suitable for solving a whole range of most unpredictable problems that will enable an individual to successfully cope with rapid changes in work, personal and social life (Hrmo, Turek; 2007). Key competences are the entire spectrum of competences that go beyond the boundaries of individual specialisations. They express a person's ability to behave appropriately to the situation, in harmony with himself. As Belz and Siegrest (2001) state, acquiring key competencies means having the ability and being prepared to learn throughout life. We can learn even as an adult. “Learning to learn” – this means the competent way in which an adult, adapted to the situation, and accepts a lifelong challenge, especially in a collegial relationship with others, so that for him life is learning and learning is life. It is challenging to know and understand the competences correctly. It is essential to recognise which behaviour contributes to or determines the success of the given position the employee will hold. Without it, it is not possible to prepare successful training and development programs, maximize the success of the selection of workers for given positions or establish

standards of good performance (Pavlov, 2018). Key competence is an internalized, interconnected set of acquired knowledge, skills, abilities, attitudes and value orientations that are vital for the quality development of an individual's personality, his active involvement in society, adequate employment and lifelong learning (Hrmo-Podaril, 2013). The Institute for Economic and Social Reforms (2006) defines key competences as abilities and skills that enable an individual to successfully integrate into social and working life. This means holding different job positions and functions, solving unforeseen problems, and coping with rapid changes in work, social and personal life.

The 2006 European Framework of Reference recommends that Member States use key competences for lifelong learning and sets out eight key competences:

1. communication in the mother tongue,
2. communication in foreign languages,
3. competences in mathematics and basic competences in the field of natural sciences and technology,
4. digital competences,
5. learn to learn,
6. social and civic competences,
7. initiative and entrepreneurship,
8. cultural awareness and expression.

Communication competences

Having the communication skills of competence means perceiving, expressing, and interpreting concepts, thoughts, feelings, facts, and opinions in written and oral form and, from a linguistic point of view, engaging in communication appropriately and creatively in various situations and social environments, including in foreign languages.

Mathematical and scientific competences

Having these competencies means functionally using mathematical knowledge and skills in various life situations, using basic knowledge and science methods to clarify natural laws, applying them in the field of technology and explaining scientific and technical progress.

Information competences

Information competence means using a computer and its accessories to obtain, assess, store, create, present and exchange information and communicate and participate in collaborative networks via the Internet.

Problem-solving skills

Having problem-solving skills means being ready to solve ordinary and non-work problems independently creatively and critically.

Learning competencies
Having learning competencies means learning to learn effectively, to continue and persist in learning, to organise one's learning, to effectively manage time and information, both individually and in a group, to evaluate the results achieved and progress in learning, to set needs and goals of your further education realistically.

Social and personal competences
Having these competencies means setting appropriate goals for personal development in the field of interest and work, taking care of your health, cooperating with others in the group and contributing to the formation of appropriate interpersonal relationships based on your knowledge of your personality.

Work and business competences
Having these competencies means turning thoughts into actions, optimally using your personal and professional prerequisites, applying creativity, innovation and risk-taking, planning and managing projects to achieve goals for successful application in the world of work, seizing opportunities for building and developing your professional career, and also in lifelong learning.

Civic and cultural competences
Having these competencies means recognising the values and attitudes essential for life in a democratic society and adhering to them, constructively participating in the events of society, acting by its sustainable development, realising the importance of creative expression of thoughts, experiences and emotions, supporting the values of national, European and world culture.

In addition to communication in the mother tongue, communication in foreign languages, competence in mathematics and basic competence in the field of natural sciences and technology, digital competences, learning to learn, social and civic competences, initiative and entrepreneurship, cultural awareness and expression, some countries also develop cultural sensitivity, work and business competences and health education. In 2018, the European Council adopted the updated Council recommendations on key lifelong learning competencies. The recommendations aim to support the development of key competences and basic skills through:

- high-quality education,
- professional training and lifelong learning for all,
- support of teaching staff,
- analysis of approaches to assessment and verification of key competences.

The Education and Training Monitor report (2019) presents the goals of the European Union. These goals relate to early school leaving, early childhood primary education, graduate unemployment rates, tertiary education, increasing literacy, numeracy and science literacy, and adult education.

According to the decision of the European Parliament and the Council of the EU No. 1720/2006/EC of 15 November 2006, which implements the program in the area of lifelong learning, defines lifelong learning as "all general education, vocational education and training, non-formal education, vocational education and informational learning during life, where its result is the improvement of knowledge, skills and abilities in personal, civic, social or employment-related efficiency". According to this definition, we can understand lifelong learning as a process of adapting to changing life conditions and a prerequisite for continuous personality development. Eight key competencies have been identified and identified by the document as those needed by all individuals to:

- personal satisfaction and development,
- active citizenship,
- social inclusion and employability (Recommendation of the European Parliament and the Council on key lifelong learning competences, 2006).

Hrmo and Turek (2003) attribute the economic benefit of key competencies to the following phenomena:

- productivity growth and increasing competitiveness,
- development of an adaptive and qualified workforce,
- creating an innovative environment.

The active approach of the individual and the modern concept of educational policy is an emphasis on the concept of learning, which enables multiple, frequent transitions between education and employment, enabling the acquisition of "qualifications and competence through different paths and at any time during life" (Pavlov, 2021). The labour market is a complex market that requires the expertise, knowledge and ability of each individual individually. Each of us has encountered increasing demands on individual job positions, knowledge of the company, or stressful situations. Therefore, according to Hrmo and Podaril (2013), much attention is paid to lifelong learning, but also to the improvement of qualifications and the development of key competencies, because they are directly related to the employment of a person in the labour market. Other educational opportunities are also defined by the OECD, which understands educational opportunities in both the formal and informal sectors as one interconnected system that should enable the acquisition of qualifications in various ways and at any time during life. The process of changes, whether they are personal, work or social, of which there are many during life, tend to be a reflection of the need for lifelong learning. Adaptation to change is a complex increase of those who cannot adapt to change. That is why the concept of a learning organisation resulting from the lifelong learning strategy, expressed in the Memorandum on lifelong learning (2000), was

created. The European Council and the member states of the European Union have defined a comprehensive lifelong learning strategy for Europe with the objectives:

- guaranteeing general and permanent access to learning to acquire and renew skills, the so-called principle of "new basic skills for all".
- visible growth of investments in human resources,
- development of effective teaching and learning methods, or so-called teaching and learning innovation,
- a significant improvement in the way of understanding and evaluating the results of learning as an activity and its results with an emphasis on evaluating learning,
- ensuring access to information and advice,
- bringing the opportunity for lifelong learning as close as possible to people, i.e. homes, regions, etc.

The Memorandum on Lifelong Learning (2000) also talks about so-called lifelong learning. This defines learning so that learning takes place regardless of life stage, place, time and form of learning. The lifelong learning strategy focuses on six basic ideas:

1. new basic skills for everyone,
2. more investments in the development of human resources,
3. innovation in the teaching and learning process,
4. the value of education,
5. new concepts of consultancy,
6. finding a path leading to easier access to education (Veteška, Turieckiová; 2008).

2.2 Criticism of Key Competences

We are witnessing a transformation of the content of education in favour of favouring competences. Bendíková (2020) calls this phenomenon a "turn to competences", and Turek (2014) talks about competence orientation in adult education. It is possible to observe tendencies to replace traditional encyclopedic knowledge with valuable knowledge for life, emphasising their applicability to real life. This trend is aptly expressed by Marks-Lajčin (2017). He emphasises that mental capacity should no longer be used as a repository of facts but should be used as a trigger headquarters for intelligent responses.
Kaščák and Pupala (2010) talk about the requirements for the new curriculum, which is also reflected in:

- new emphases at the level of regional education standards, qualification profiles,
- performance standards of teachers and in national testing systems.

Kaščák and Pupala (2007) compare the curriculum change due to the prioritisation of competences to its change to the business curriculum. Here we come across the fact of assessment quality of education based on the criterion of economic utility. At the same time, it is desirable to realise that such characteristics as entrepreneurship and initiative are

explicitly expressed in the list of key competencies. The authors, and I with them, are aware of the reality of assessing individuals based on the sum of their competencies, which contribute to the economic prosperity of society. A similar opinion is held by Ribbolits (2004), who draws attention to the perception of the educational system as a supply agency for economic events to create an economically usable workforce. According to the author, lifelong learning should lead people to function as a cog in the political-economic system, the driving force of which is the transformation of money into more money and certainly not the humanisation of the world. He sees learning as an act of subjection, not liberation, not the education of individuals, but only the education of "capital" through the qualification training of subjects for potential purchasers of labour-power goods. We find the coercive rather than the voluntary character of lifelong learning in the work of Kaščák and Pupal (2010): "who claim that the education model framed by the requirement to shape competences is a radical intervention in the overall concept of education. Its basic feature is the effort to dissolve the dividing line between general and professional education through the establishment of competences as the goals of education and as the principle of designing its content to cover such needs that belonged more to the goals of professional education."

I find their warning about the disappearance of general education in its general cultural and academic concept alarming and worthy of thought. Kissné Zsámboki (2021) claims that he particularly notices change in relations between social groups: "The introduction of competences in education is the basis of new power relations between social groups because it introduces an asymmetry in favour of employers, entrepreneurs, economic practice in the expense of schools, teachers, students, general culture."

3 Vocational Secondary Schools in Slovakia

We can generally define a school as "an institution that specialises in training as opposed to a company that offers training in conjunction with producing goods. Some schools, such as those for barbers, specialise in one skill, while others, such as universities, offer a wide and diverse set. Schools and companies are substitute sources for specific skills" (Porubčanová, 2018). Secondary vocational school, which offers opportunities for we will investigate increasing the employability of its graduates; we understand a school in which graduates can obtain upper secondary education completed by the matriculation exam. In evaluating a (specific) secondary vocational school, we must consider that its competences are limited to some extent by applicable legislation. With the reform in 2008 in education, they also introduced state educational programs (hereafter referred to as SVP), which define and delineate the content of education and training in schools in accordance with internationally valid standards. ŠVP defines:

a) the generally binding goal, content, scope and conditions of education at ISCED for the given groups of study fields,

b) the target quality of the student's personality, which the student has after completing education and training to reach,
c) rules for creating school educational programs, evaluation of results education,
d) binding basis for determining financial resources. (ŠVP)

The Vocational Education and Training Act of 2009 established the rights and obligations of all participants and created space for the involvement of employers and employers' unions, and private investment capital in the vocational education and training system. The reform of secondary vocational education was supposed to enable a more flexible profiling of graduates of study fields according to the conditions of the school. At the same time, the fields of study should respond to the needs of the regional labour market and the individual abilities and interests of the pupils. All state secondary schools in the Slovak Republic must comply with the Education and Training Act (245/2008 Coll.). According to this law, the goal of upbringing and education is to enable a child or pupil to get an education (according to this law), to acquire competences, especially in the field of communication skills, oral skills and written skills, use of information and communication technologies, communication in the state language, mother tongue language and a foreign language, mathematical literacy, and competence in the field of technical natural sciences and technologies, for lifelong learning, social competence and civic competence, entrepreneurial skills and cultural competence, command of the English language and at least one. For each group of study fields with experience, through professional training and extension studies, there is one SVP, another foreign language and being able to use them, learn to correctly identify and analyse problems and propose their solutions and be able to solve them, develop manual skills, creative, artistic psychomotor skills, current knowledge and work with them on practical exercises in the areas related to further education or current requirements on the labour market, learn to develop and cultivate your personality and lifelong learning, work in a group and take responsibility.

Thus, the law responds to new trends in technology and the economy and focuses on developing a wide range of knowledge, skills, and abilities. On the one hand, we will be interested in how the secondary vocational school we have chosen helps to fulfil work with current knowledge, which is required by the labour market, and on the other hand, which area of competence employers value the most. Even though, at first glance, pedagogues have relatively high autonomy because they work in the classroom without external control, “in educational situations, they are required to assess the children´s needs themselves, react flexibly and carry out effective interventions. On the other hand, in educational situations, they are still significantly limited by the uniformity of educational goals and contents, the overcrowding of which leads to the uniformity of forms and methods of education”. (Kaščák & Pupala 2007)

3.1 Key Competences of a Secondary Vocational School Graduate

According to the SVP, a graduate of the Secondary Vocational School has the following key competencies to develop during their studies at this school: Competence for lifelong learning – with this competence, the graduate realises the need for autonomous learning as a means of self-realisation and personal development, can reflect on the process of own learning when acquiring and processing new knowledge, and applies various learning strategies. The graduate can think critically, evaluate information, use it practically, and subsequently know how to accept feedback. The graduate can become familiar with motivational programs aimed at solving problems. The graduate realises the need for autonomous learning as a means of self-realisation and personal development.

Social communication **competences** – with this competence, a graduate can use all available forms of communication when processing and expressing information of several types, have adequate oral and written expression. The graduate masters self-presentation and knows how to translate the results of his work to the public, where he uses professional language. The graduate understands the meaning and applies communication skills that are the basis of effective cooperation, based on mutual respect for rights and obligations to take personal responsibility.

Competences to apply mathematical thinking and cognition in the field of science and technology – the graduate uses mathematical thinking to solve practical problems in everyday situations. It uses mathematical models of logical and spatial thinking. He knows how to use the basics of natural literacy, enabling him to make scientifically based judgments while using the acquired operational knowledge to solve problems successfully.

Competences in the field of information and communication technologies – the graduate effectively uses information and communication technologies in his education, creative activities, project teaching, and expressing his thoughts and attitudes when solving real-life problems. The graduate realises the importance of recognising virtual and real life. He understands the opportunities and possible risks associated with using the Internet and information and communication technologies. He knows how to think algorithmically and controls the operation of peripheral devices necessary to operate the used program. The graduate can assess the credibility of information sources, proceed critically to obtain information and then record, sort and store it so that he can use it at work or in his personal life.

Competence to solve problems – the graduate applies appropriate methods based on analytical-critical and creative thinking when solving problems. He formulates arguments and evidence to defend his results. The graduate knows the pros and cons of individual solutions

and is also aware of the need to consider their risk levels. Can resolve conflicts constructively and cooperatively. The graduate can clarify the most serious features of problems in the form of systematic knowledge and use various generally applicable rules for this purpose. The graduate can evaluate the meaning of various information, independently collect information, sort it and use only the most important ones for clarifying the problem. The graduate can take creative risks, adequately criticise, take a clear approach to solving problems, make quick decisions, be consistent, and inspire others when looking for ideas, initiatives and creating possibilities.

Civic competences – the graduate is aware of fundamental humanist values and the meaning of the national cultural heritage and applies and protects the principles of democracy. The graduate understands his interests in connection with the interests of the wider group. He is aware of his rights in the context of a responsible approach to his duties and contributes to the fulfilment of the rights of others. The student can understand the systemic nature of the world. It recognises that decisions and actions taken by individuals or groups will impact the global present and future. The graduate is oriented on the issue of uneven economic development, ethnic, religious, and racial conflicts, and terrorism and suggests ways to eliminate them. He understands the concepts of justice, human rights and responsibility, where he can apply them globally. The graduate observes the law, respects the rights and personality of other people, and their cultural specificities, and speaks out against intolerance, xenophobia and discrimination. At the same time, the graduate is actively interested in political and social events in Slovakia and the world.

Social and personal competences – the graduate reflects his own identity and builds his autonomy and independence as a member of the whole. Based on self-reflection, he sets his goals and priorities by his actual abilities, interests and needs. Significantly participates in setting corresponding short-term goals aimed at improving own performance. He knows how to verify and interpret information and subsequently establish hypotheses. It creates a value system. The graduate can fulfil a task plan aimed at the given goals and try to improve them through self-control, self-regulation, self-evaluation, and decision-making. At the same time, he can verify the acquired knowledge and critically assess the opinions, attitudes, and behaviour of others. He has a responsible attitude towards his health; he takes care of his physical and mental development and is aware of the consequences of an unhealthy lifestyle.

Work competences – the graduate can set goals about his professional interests, critically evaluates his results, and actively approaches the realisation of these goals. He can accept and manage innovative changes. The graduate understands business principles and considers his assumptions when planning and applying them. Can obtain and use information about educational and employment opportunities. The graduate understands and can evaluate his participation in the educational process and its outcome, which ensures the citizen's right to free movement to live, study and work in the conditions of an open market. He knows how to

assess the professional offer on the Slovak and European labour markets and flexibly respond to them through further education. He knows how to present himself and act appropriately during a job interview. He can search for and assess business opportunities by the reality of the market environment, his assumptions, and other possibilities.

Competencies aimed at initiative and entrepreneurship – the graduate can innovate the usual procedures for solving tasks and plan and manage new projects to achieve goals in work and everyday life. He knows how to navigate various statistical data and know how to use them for his own business. The graduate recognises and develops the qualities of a managerial employee with communication skills, assertiveness, creativity, and resistance to stress. Uses the principles of constructive criticism, being able to criticise appropriately and tolerate criticism from others. He knows the principles of safety and health protection at work.

Competencies to perceive and understand the culture and to express oneself with the tools of culture – the graduate can express himself at a higher level of artistic literacy through the expressive means of visual and musical arts. He is aware of the importance of art and cultural communication in his life and the life of the whole society. The graduate knows the rules of social behaviour and, at the same time, behaves in a cultured manner appropriate to the situation's circumstances. He is tolerant and empathetic towards expressions of other cultures.

4 Conclusion

All OECD countries agree on the importance of key competencies. The need to develop key competencies at all levels and lifelong learning has been a topical topic for a long time. According to the information presented in our article, the most critical knowledge, skills and abilities required to achieve success in employment as well as in personal life are listed. Significant attention is paid to working with key competencies. It is known that the need for key competencies and their lifelong development means potential for a better workplace, personal life or personal development. In the school educational program and subsequently, in the study and teaching fields, the graduate's key competences are developed by making knowledge available in an appropriate and comprehensible manner with an emphasis on developing all key competences without prioritising one key competence over another. Appropriate key competencies are activated in new situations and subsequently offer a wide range of possibilities for quickly and successfully solving the given problem and coping with the changes that new situations have brought.

Acknowledgement
This article was published due to the project KEGA 012TTU-4/2021, “Integration of the usage of distance learning processes and the creation of electronic teaching materials into the education of future teachers”.

References

Bendiková, E. (2014). Lifestyle, physical and sports education and health benefits of physical activity. *In European researcher: international multidisciplinary journal.* Sochi: Academic publishing house Researcher, *69*, (2-2), pp. 343-348. ISSN 2219-8229.

Bendíková, E. (2020). Diversification of the physical and sport education syllabi and its effects on the musculoskeletal system in young female students. Trends in Sport Science, *27* (3), p. 149-155. https://doi.org/j56t

Belz, H., & Siegrest, M. (2001). Klíčové kompetence a jejich rozvíjení. Praha: Portál 2001, 375 s.

Hrmo, R., & Turek, I. (2003). *Kľúčové kompetencie* 1. Bratislava: STU, 2003. ISBN 80- 227-1881-5

Hrmo, R., & Podaril, M. (2013). *Introduction of Quality Management Systém for Vocational Education and Training in Slovakia* (e- document). In International Journal of Engineering Pedagogy. Wien: International Association of Online Engineering, *3*, Issue 3, pp. 18-23 (online) ISSN 2192-4880. https://doi.org/j56w

Kaščák, O., & Pupala, B. (2007). Verachtung der Pädagogik und Verachtung in der Pädagogik – Erfahrungen hinter der östlichen Grenze. *In N. Ricken (Ed.), Über die Verachtung der Pädagogik. Analysen – Materialien – Perspektiven* (pp. 373–396). Wiesbaden: VS Verlag für Sozialwissenschaften.

Kaščák, O., & Pupala, B. (2010). Neoliberálna guvernmentalita v sociálnom projektovaní vzdelávania. Sociologický časopis, *46* (5), 771–799.

Kissné, Zsámboki, R. (2021). Projekt alapú aktív tanulás a kisgyermeknevelésben és az iskolai oktatásban Sopron, *Magyarország: Soproni Egyetemi Kiadó*, 82 p. ISBN 9789633343838

Marks, I., & Lajcin, D. (2017). *Anton Štefánek a slovenské školstvo v medzivojnovom období – vybrané problémy*. Brno: Tribun EU, p. 119. ISBN 978-80-263-1362-5.

Marks, I., & Lajcin, D. (2016). Moderná škola v ponímaní Antona Štefánka. In *Paidagogos: časopis pro pedagogiku v souvislostech*, *2*, p. 125 – 140. ISSN 1213-3809.

Pavlov, I. (2018). Poradenstvo v podpore profesijného rozvoja pedagogických zborov škôl = Guidance in support of professional development of pedagogical staff at schools. *In Orbis scholae : odborný recenzovaný časopis zaměřený na problematiku školního vzdělávaní v jeho širších sociokultúrních souvislostech : kurikulární reforma v ČR a SR 10 let poté: bilance a výzvy pro současnou školu.* Praha: Univerzita Karlova, Pedagogická fakulta, *12* (3), p. 31-45. ISSN 1802-4637.

Porubčanová, D. (2018). Analýza rolí profesie vysokoškolského učiteľa I*n Vzdělávání dospělých 2017* – v době rezonujících společenských změn: proceedings of the 7th International Adult Education Conference. Praha: Česká andragogická společnost, pp. 245-255 [print] ISBN 978-80-906894-2-8.

Szőköl, I. (2016). *Educational evaluation in contemporary schools*. Szeged: Belvedere Meridionale, 159. p., ISBN 978-615-5372-60-5.

Turek, I. (2014). *Didaktika.* Bratislava: WOLTERS KLUWER, p. 164-166. ISBN 978-80-8168-004-5.

The Influence of Innovative Teaching Methods on Student Motivation

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DOI: https://doi.org/10.53349/resource.2023.is1.a1203

Abstract

The paper´s purpose is to find the options motivating students in secondary schools to try to achieve more interest in knowledge and know-how. We have already known about some elements of motivation, but which one of them is the most effective? There are existing factors to motivate students, but unfortunately, we cannot manage all of them. We have tried not only to achieve how to motivate more but also have been trying in this article to search for factors which show our success and unsuccess our motivation attempts.
The paper also deals with the impact of innovative teaching methods on students' motivational factors.

Keywords: Motivation, Activation, Factors affecting motivation, Teaching methods

1 Introduction

We often come across the term “motivation”. The reason for this is the fact that it is necessary to arouse a particular interest in “doing something”, “solving tasks, problems, situations”, “improving”, and “collecting knowledge, skills” in various situations. Without motivation, we do not have the strength to progress, improve and solve certain challenges in our everyday life. Motivation is needed by the teacher, the student, the school management, and also other employees in education.

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2 Motivation, Activation

To understand the forms, methods, means and benefits of motivation, we need to look a little more in detail. We need to set the teaching process's goals and determine the sequence's individual steps in the direction of student activation.

> "All modern concepts of the teaching process agree that the student must be motivated and active in the teaching process, which is necessary to eliminate the passivity of the students, typical of traditional teaching, in which the student mainly paid attention, listened, and wrote what the teacher told him, he imitated the teacher and worked according to his model. It is necessary that the student seeks and discovers knowledge through an independent, active, conscious, and creative learning-cognitive activity under the teacher's guidance as well." (Turek, 2014, p. 164)

2.1 Motivation – the Work of the Teacher

> "At present, it is not possible to expect all students to learn by themselves, only to satisfy their own needs. Many teachers do not know how to organise teaching in such a way that it fulfils the psychological needs of students. This is precisely why external motivation, realised through external interventions, also has its role. The most common means of external motivation in students' learning activities are the reward and the punishment." (Turek, 2014, p. 166)

The teacher is competent in determining the evaluation criteria and, thus, the requirements for mastering theoretical and practical tasks. Rewarding a good, hard-working, and diligent student is relatively easy. Good grades probably inspire all students. Quality preparation for the class and time sacrificed to solve homework will bear fruit.

If we want to progress in student motivation, we need to put some important components in order. They are pupil, teacher, school, and curriculum. The precise connection of these four components creates the necessary background for achieving the goal. When one of these elements does not meet the objective requirements, it is very complicated to achieve motivation and thus the work and knowledge progress of pupils. Allow us to describe these components a bit and our expectations related to them.

Pavlov (2018) writes that in the case of teachers (the subject of the educational process), a person emerges in our imagination as the main organizer and implementer of education and training. The success of the educational process is not accidental, but depends on the teacher, on his approach to work and to students. There are many perspectives on how to define the personality of a teacher and what we would expect from him. He is a source of motivation, because he tries to use various activating methods to arouse students' interest in the subject, arouse curiosity about a specific issue (solving examples), and increase the range of acquired and applicable knowledge, learning and skills (Ugrai, 2020).

A teacher must have a suitable "tool" for all types of students in order to be able to intervene pedagogically in a timely, flexible, and creative way. Somewhere, the intervention consists of searching for new activating methods, while in other places, more emphasis must be placed on the educational side of the teacher's work.
An essential part of the educational process is the student and teacher interaction.
"The essence and the basis of interaction depends on a consistent and comprehensive recognition of the student. For instance:

- the student's health status,
- family environment and background,
- the level of psychological and cognitive processes,
- the student's interests,
- the student's position in the class group,
- how the student behaves in other lessons, with other teachers." (Petlák, 2000, p. 25)

"The creation of a good relationship between the teacher and the students is completely in the hands of the teacher. With his sensitivity to them, his sensitive response to their problems, his interests, etc., he wins them over. Proper interaction is a prerequisite for good learning and student behaviour. The school management should also investigate the level of interactional relations." (Porubčanová, 2018)

2.2 Motivation Versus Fear

Several things fundamentally affect the healthy motivation of students. A well-known "enemy" of motivation is fear. Acting under fear or motivation is not the same thing.
Several factors can cause fear in pupils:

- inappropriate school climate,
- conflict with the teacher,
- conflict with classmates,
- exclusion of the student from the collective,
- health, mental, and visual handicap,
- fear of punishment without justification,
- bullying,
- fear of the future (exams, dictation, tests),
- tension and dislike related to the school itself (teaching, upbringing, demands, conditions),
- anxiety in front of people.

Therefore, it is essential that we also perceive the above factors when working with students and monitoring their learning abilities. Our attention should also be focused on the person/personality of the pupil and not only on his learning abilities.

2.3 Factors Affecting Motivation

Pupils' motivation is influenced by several external and internal factors, which the teacher should take into consideration. Some can be mitigated and intensified and some cannot. Not every student perceives motivational stimuli similarly (Hrmo & Turek, 2013).
It depends on the pupil's character, internal qualities, logical thinking, ability to accept new information, physical and mental abilities, social background, current mental state, etc. The teacher should choose to activate elements to consider as many factors as possible. Not all factors can be perceived by the teacher, nor is it his duty especially when many students in the class have different physical and mental dispositions (Pavlov, 2018). In that case, it is impossible to please everyone. One should choose such a mixture of motivational/activating means that, from a global point of view, will be the most beneficial for the class, even considering specific individuals.
Factors that can negatively affect the effectiveness of incentives:

- poor mental health,
- weak psychological resistance,
- problems in the family,
- problems in the relationship with the partner,
- bad rhetoric, inappropriate teacher's lecturing style,
- boring way of teaching,
- unsuitable ergonomic conditions in the classroom,
- disturbing environment,
- a very condensed program within the lesson,
- the pupil's exhaustion in the last hours of the day,
- low energy, fatigue.

Factors that can positively affect the effectiveness of motivational elements:

- pleasant school environment,
- work in a team,
- willing teachers,
- balanced curriculum,
- positive characteristics of the teacher,
- an exciting way of teaching,
- sufficient energy of pupils,
- objective assessment,
- appropriate connection between theory and practice,
- suitable didactic technique and tools,
- a balanced number of students in the class/group.

Therefore, the teacher should consider in which class and how he will motivate the student. When a student has psychological or mental problems, feels anxious, cannot concentrate in class, thinking about his problems with his parents..., it is challenging to get that student interested in active cooperation in class. When the teacher does not have a suitable approach, is not sufficiently prepared for the lesson, chooses an inappropriate style of explaining the subject matter, reacts poorly to the students' questions, uses too many technical words, etc., the student hardly becomes active according to the teacher's ideas (Ugrai, 2020). The location of the hour in the daily schedule is also an essential factor. In the 5th, 6th, and seventh lessons, the student no longer has energy, feels tired, does not have such concentration, does not respond so flexibly to questions, is not that creative, and it is much harder to create the motivation itself.

3 Teaching and the Impact on Results

Due to certain factors influencing the students, we know that we must make a great effort to get the necessary result at the end of the lesson. It is not easy, so it is necessary to create an adequate explanation when things do not go as expected (Marks & Lajčin, 2017). That is why we must also consider facts such as extraneous subjects in the timetable, the student's social and family background, or computer technology and networks.

3.1 The Influence of Foreign Teaching Subjects in the Timetable

At the beginning of the lesson, it is vital to prepare the students for the new subject to arouse their interest in the new topic. Arousing sufficient interest can be very difficult for the teacher; honestly, not a single student is interested in the full scope of everything included in the thematic plan (Bendíková, 2020). Each student has topics closer to his heart and topics that do not arouse such great enthusiasm even in them. However, we must arouse such interest in the students in all teaching topics that we can evaluate the entire 45 minutes as beneficial at the end of the lesson. When motivating the pupils, it should not be forgotten that the pupils have already completed other subjects on that day, on which the teachers also demanded concentration and cooperation. So how is it with the students and their motivation? Is a 5-minute break enough for students to reorient themselves from the previous lesson’s motivation to the next? Let us imagine that we are watching a good movie on TV, and after that, we switch to a sports channel. Are we also interested enough to watch tennis after an exciting action movie suddenly? Something similar is also the case with pupils. Do we want them to suddenly find themselves in the “realm of secrets” of the business economics subject after an interesting history lesson? Of course, we want to, because our job is to pass on knowledge in the subjects we have in our schedule. So, how can we direct the student’s attention to the topic of our lesson? The answer lies in us and our abilities.

3.2 Social and Family Background

A student can concentrate 100 per cent on a lesson only if various psychological problems do not hinder him. There can be many of them. For example, problems with parents, a partner, and a confident teacher can also be disagreements with a roommate, with the lady in the school buffet, etc. We, the teachers, do not need to know about these problems because it is not our duty to take care of the behind-the-scenes feelings of the students, or is it? How would we be able to determine the boundary between what we want to know about students and what we do not? In this case, there is a difference between a subject teacher and a classroom teacher. After all, the class teacher is also in contact with the parents and can better assess the student's mental and emotional state. The school psychologist also has an important role. Through his activities, he prepares the student so that he can concentrate sufficiently on lessons even in the event of family problems.

3.3 Computer technologies, Facebook, games, internet

The question arises as to how to motivate the student to concentrate on the class of a professional subject while also studying professionally at home during his free time. Yes, even when chatting or using the services of Facebook, TikTok, etc., the student is professionally educated. He absorbs new technical skills, advances in typing and operating the keyboard, learns new technical expressions and looks for different options for the best, most efficient, and most comfortable use of technical means. If we were to compare people in their 60s and 70s with students using the Internet and various computer applications, with few exceptions, the students are miles smarter. Imagine that in the world of computer games, limitless Internet possibilities, new computer applications, chats, online dating options, etc., teachers must make students interested in our lessons, new topics, homework, etc. It is not easy, but an experienced teacher always finds suitable means and methods. Perhaps a teacher with an out-of-date understanding of the progress of computer technology is furious when he sees a student's cell phone in hand, Facebook or the Internet turned on, but how about using this "technical enemy" to our advantage? Why not connect the Internet, Facebook, etc., with the teaching process? When a student is already a "slave" to computer applications, let us, the teachers, try to get something out of it for the benefit of taking on new subjects or assigning tasks.

Problem: The student is still on Facebook.
Solution: I will create a Facebook group for the students, and there I will save the components of the new curriculum that I did not have time to dictate/explain in class, as well as homework.

Problem: The student is constantly surfing the Internet.

Solution: I assign the task of obtaining information, statistical data, economic results, and similar data as part of class work or homework.

Problem: The student prefers computer games.
Solution of a technical nature: The student should get as much information as possible about the creation of certain software, how to create a suitable algorithm for a given computer game, what computer technologies to use when assembling a high-quality computer, on which computer games have a high-quality background, where to get suitable computer components (graphics card, processor...).
Solution of an economic and marketing nature: The student should conduct market research on the prices of computer games, obtain information about the economic background of the computer game provider, who are its business partners, what financial results it achieves, let it compare competing providers, determine their pros and cons. The student has to describe what he would change about those games, how the packaging would look according to his taste, how he would advertise and how he would approach potential customers to buy this game...

The “enemy” in the form of excessive computer orientation of pupils immediately becomes our “friend” and “co-creator” of the content of the lesson.

4 Conclusion

We know how important motivation is in the teaching process, how it can positively influence the student's view of the subject matter, how it can increase his interest in new knowledge and thereby increase his knowledge, skills and, in the future, the ability to achieve success on the labour market. On the other hand, we also know there is no need to exaggerate the motivation because it can lose its charm, and we easily fall into the pit of over-motivation. For each lesson, you must prepare a few activating spells that will work with the greatest certainty. They must be tested because not every student in every class perceives motivational impulses similarly. Each lesson, each topic and each group of students needs an individual approach when examining and choosing appropriate methods and means of motivation. We must consider many things that are an essential basis for student activation. These are human qualities and the school's technical and personnel capabilities. Teachers must also keep up with the developing world and gain new experiences. It is also necessary to discuss with colleagues what experiences, feelings and results we have after applying various motivational methods and aids.

Acknowledgment

This article was published due to the project KEGA 012TTU-4/2021, “Integration of the usage of distance learning processes and the creation of electronic teaching materials into the education of future teachers”.

References

Bendiková, E. (2014). Lifestyle, physical and sports education and health benefits of physical activity. In European researcher: *international multidisciplinary journal. Sochi: Academic publishing house Researcher*, *69*, (2-2), pp. 343-348. ISSN 2219-8229.

Bendíková, E. (2020). Diversification of the physical and sport education syllabi and its effects on the musculoskeletal system in young female students. *Trends in Sport Science*, 2020, *27* (3): 149-155. https://doi.org/j56t

Benedek, A. (2015). Visuality as a tool for expanding learning. In: António Moreira Teixeira, András Szűcs, Idikó Mázár (szerk.), *Annual Conference. Barcelona: European Distance and E-Learning Network (EDEN)*, pp. 3–8. ISBN:978-615-5511-03-5

Belz, H., & Siegrest, M. (2001). *Klíčové kompetence a jejich rozvíjení*. Praha: Portál 2001, p. 375.

Hrmo, R., & Turek, I. (2003). *Kľúčové kompetencie 1*. Bratislava: STU, 2003. ISBN 80-227-1881-5.

Kissné, Zsámboki R. (2021). Projekt alapú aktív tanulás a kisgyermeknevelésben és az iskolai oktatásban Sopron, Magyarország : Soproni Egyetemi Kiadó, 82 p. ISBN 9789633343838.

Marks, I., & Lajcin, D. (2017). *Anton Štefánek a slovenské školstvo v medzivojnovom období – vybrané problémy*. Brno : Tribun EU, 119 p. ISBN 978-80-263-1362-5.

Marks, I., & Lajcin, D. (2016). Moderná škola v ponímaní Antona Štefánka. In Paidagogos : časopis pro pedagogiku v souvislostech, *2* (ročník 2016), pp. 125 – 140. ISSN 1213-3809.

Pavlov, I. (2018). Poradenstvo v podpore profesijného rozvoja pedagogických zborov škôl = Guidance in support of professional development of pedagogical staff at schools. *In Orbis scholae : odborný recenzovaný časopis zaměřený na problematiku školního vzdělávaní v jeho širších sociokultúrních souvislostech: kurikulární reforma v ČR a SR 10 let poté: bilance a výzvy pro současnou školu.* Praha : Univerzita Karlova, Pedagogická fakulta, 12 (3), p. 31-45. ISSN 1802-4637.

Petlák, E. (2000). *Pedagogicko-didaktická práca učiteľa.* Bratislava: Iris. ISBN 80-89018-05-X, s. 12-27.

Porubčanová, D. (2018). Analýza rolí profesie vysokoškolského učiteľa In *Vzdělávání dospělých 2017* – v době rezonujících společenských změn: proceedings of the 7th International Adult Education Conference. Praha: Česká andragogická společnost, pp. 245-255. [print] ISBN 978-80-906894-2-8.

Szőköl, I. (2016). *Educational evaluation in contemporary schools*. Szeged: Belvedere Meridionale, 159. p., ISBN 978-615-5372-60-5.

Szőköl, I. (2015). Quality management system in the educational process. In Gómez Chova, L. – López Martínez, I. – Candel Torres, I. (eds.): *8th International Conference of Education, Research and Innovation*. Seville (Spain): IATED Academy, s. 7282–7285. ISBN 978-84-608-2657-6.

Ugrai, J. (2020). Going on Their Own Way. Protestants’ Specific Models of Joining the Cultural Elite in 19th-century Hungary. In: Espacio, Tiempo y Educación, 7 (2), 119-133, http:// dx.doi.org/10.14516/ete.243

Turek, I. (2014). *Didaktika.* Bratislava: WOLTERS KLUWER. ISBN 978-80-8168-004-5, p. 164-166.

The Benefit of Professional Education on the Performance of Civil Servants

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DOI: https://doi.org/10.53349/resource.2023.is1.a1204

Abstract

The paper is devoted to the benefit of professional education to employees' work performance. A properly set up education system motivates employees to continue their education and subsequently facilitates their work activities. However, simply completing a properly planned training course may not guarantee the facilitation of the performance of work activities. By subsequent evaluation of the educational activities of the employees, it is necessary to find out whether the setting of professional education is beneficial for them or not. The education system needs to be looked at holistically. It is impossible to separate the benefit for the employees and the knowledge gained by completing the course. Therefore, it is necessary to focus on the effectiveness of professional education to determine knowledge at the input and output of educational courses. The research was based on findings from groups of civil servants.

Keywords: Vocational education, Work activities, Civil servants

1 Introduction

The paper deals with why the completion of professional training courses is not beneficial for the employees of the customs administration for their work performance. In 2020, due to the covid-19 pandemic, the massive onset of distance education began. Full-time teaching was cancelled and in a relatively short period of time, it was switched to distance learning. Many financial resources were invested in acquiring hardware and software, and study supports were prepared. In advance, no one had decided whether the effectiveness of distance

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education would be like that of full-time teaching. Now, with time, we can check whether the changes that occurred in 2020 in the field of education are in the right direction.

2 Professional Education

Many authors deal with issues of professional education. In his monograph, Koubek (2015) calls the field of vocational education the term of qualification formation or the field of professional or professional training (Koubek, 2015, p. 255). Koubek solves in detail the system of human working abilities into three basic areas:

- the field of general education,
- the field of professional education,
- area of development.

The field of general education is implemented in school facilities supervised by the state. The area of professional education or professional training can be implemented in school facilities and within individual organisations.

In her book, Bartoňková (2010) focuses on company education, which states that company education includes mandatory and qualification training of employees. This is part of professional education and provides for developing employee competencies. It also includes acquiring, increasing, deepening, and maintaining the qualifications of employees. Bartoňková perceives corporate education as a part of professional education, which is much broader, and characterises it as the search for and subsequent elimination of the difference between "what is" and "what is desirable" (Bartoňková, 2010, p. 11).

Vodák & Kucharčíková (2011) solve the issues of vocational training only in the context of a company and therefore use the term corporate training. They deal with the issue of competences for already working individuals in connection with new technological changes and the need to ensure the efficient functioning of the company. They deal in detail with the area of planning, implementation, and subsequent evaluation of education.

Mužík (2010) deals with the field of education from the point of view of andragogic didactics. Unlike Vodák & Kucharčíková (2011), Koubek (2015) and Bartoňková (2010), he does not put the field of professional education into context with personnel planning. Still, he deals with the specifics of andragogic didactics and presents the characteristics of selected methods in adult education. Mužík defines andragogic didactics as a theory of teaching adults, where on the one hand there is a lecturer who teaches and on the other hand a participant (adult individual) who learns. The essence of andragogy didactics consists in defining the goals and contents of teaching. Mužík (2010, pp. 16–17) further states that during vocational training, there is an increasingly frequent shift from theoretical knowledge to realistically solved problems.

Plamínek (2014) deals with the issue of adult education in his publication. Like Mužík (2010), Plamínek (2014) does not address the field of education in the context of personnel planning but deals with the meaning and essence of learning, which, according to Plamínek,

expands a person's potential. Plamínek (2014, p. 19) does not perceive human resources as only individual workers, but as individuals who have knowledge potential that they can use to perform their work.

Průcha (2019) deals with vocational education at the secondary and higher vocational education levels. It describes in detail the system of vocational education in the Czech Republic, both in history and the present. It also mentions the characteristics of vocational education systems in selected European Union member states.

3 Survey Methodology

To measure the effectiveness of education in customs administration, three educational courses were selected. The first course took place in a standard full-time format, the second in a distance format and the third course again in traditional full-time teaching. As part of the testing, the participants' knowledge was measured at the beginning of the course and at the end of the course. The quality of the presented educational tests was consulted with the lecturers. The reliability of the presented tests was verified by calculation. The Kuder-Richardson formula was used to calculate reliability. The average increase in knowledge for the monitored group was calculated according to the modified formula of G. Hubner (Králová & Novák, 2014 p. 257).

3.1 Effectiveness of Education in Full-time Teaching First Course

The course “Specialized Professional Training Mobile Diagnostics” was chosen to test the effectiveness of education in customs administration. The selected course took place full-time in the customs administration training centre. The total duration of the course was 33 hours. A total of 28 members of the customs administration took part in the course. The course was focused on handling mobile diagnostics.

3.1.1 Testing

Course participants were informed that their knowledge would be tested both before the start of the course and subsequently on the final day after the end of the course. The pre-test took place on the first day after the initial formalities before the start of the actual teaching. During the testing, participants were not allowed to use mobile phones due to the search for correct answers and the possibility of taking photos of the test questions. All those present agreed to perform the test. To identify the test or pair them, the participants entered their first name, length of experience and age in the recording sheet. Based on this data, the tests at the beginning and end of the course were matched.

The content of the test was consulted with the lecturer regarding content and expertise. The final test results were not used to evaluate the applicants, and the lecturer used her own

set of test questions. The table below shows the summary results of the participants from the pre-test and post-test; their point changes, in this case, increases and percentage success.

Pre-test		Post-test			
Average pre-test score	Average success rate	Average post-test score	Average success rate	Average point gain	Improvement index
10.54	70.27%	13.18	87.86%	2.64	1.25

Table 1: Knowledge results of participants in full-time teaching

In total, 28 participants again participated in the second test, and each of them succeeded. All participants showed better knowledge in the final test compared to the pre-test. The improvement index was calculated as the ratio of the average percentage of success in the post-test and the pre-test and had a value of 1.25. The average point gain in the pre-test and post-test comparison was 2.64 points. The knowledge gained of the course participant was calculated according to the formula:

$$E = \frac{V_{post} - V_{pre}}{V_{max} - V_{pre}} . 100$$

V_{pre} the knowledge that the participant had before completing the course
V_{post} the knowledge that the participant had after completing the course
V_{max} the maximum possible knowledge that the participant could acquire in the course

Based on the testing, it was found that all course participants had an increase in their knowledge. All participants also met the 50% threshold for successful course completion.

3.2 Effectiveness of Education in Online Learning

To further test the effectiveness of education in the customs administration, the “Vocational Training of Agenda Investigation” course was chosen. Unlike the previous course, this occurred online through the Microsoft Teams application. The total duration of the course was 66 hours. A total of 30 members of the customs administration took part in the course, with three members having an individual study plan. The course was devoted to substantive law issues and procedural law in application of practical examples.

3.2.1 Testing

Course participants were informed that their knowledge would be tested both before the start of the course and subsequently on the final day after the end of the course. The pre-test took place on the first day after the initial formalities before the start of the actual teaching. Since the learning took place online through the Microsoft Teams application, course participants received a test in an interactive form in *.docx format. They then submitted the completed forms electronically. All those present agreed to perform the test. To identify the test or pair

them, the participants entered their identifier in the recording sheet at their discretion, e.g. personal number, first name, or initials. Based on this data, the tests at the beginning and end of the course were matched.

The final testing took place during a full-time meeting on the final exam day. The course participants filled out an identical test again, but in paper form. Participants had a total of 25 minutes to complete the test.

The content and expertise of the test were consulted with the course lecturer. The course results were not used for the participants' evaluation but were handed over to the lecturers for further use. Testing, of course, participants were based on case studies. Each participant chose a case from practice and based on the acquired knowledge, had to propose a way to solve it.

The table below shows the summary results of the participants from the pre-test and post-test, their point changes and percentage success.

Pre-test		Post-test			
Average pre-test score	Average success rate	Average post-test score	Average success rate	Average point gain	Improvement index
11,41	76,05 %	11,19	74,57 %	-0,22	0,98

Table 2: Knowledge results of participants in online teaching

In total, 27 participants again took part in the second test. 26 participants passed, and 1 failed because he had 7 points from the test, which is 46.67%. The average point value was 11.19 points, which is 74.57%. Out of the total number of 27 participants, only 10 interviewees showed higher knowledge, 4 participants did not change issues, and the remaining 13 participants showed lower values in the post-test.

The improvement index was calculated as the ratio of the average percentage of success in the post-test and the pre-test and had a value of 0.98. The average point gain in comparing the pre-test and post-test was -0.22 points. Thus, the students show lower knowledge in the post-test than in the pre-test.

It is clear from the conducted testing that almost half (48,18%) of the applicants experienced decreased knowledge after passing the test. A total of 4 respondents (14.81%) had the same understanding. Improvement in ability was reported by only 10 interviewees, i.e., 37.04%. One participant had a knowledge level below 50% (46.67%). If the required threshold for passing the course were 50%, this participant would fail the final test. The comparison of points obtained in the pre-test and post-test is shown in the graph below.

3.3 Effectiveness of Education in Full-time Teaching Second Course

To further test the effectiveness of education, the course ”Vocational Training of Agenda Taxes” was chosen. The selected course was again held at the customs administration training centre. The total time allowance of the course was 64 hours, and 8 hours for the exam. A total of 27 participants took part in the course.

3.3.1 Testing

The course participants were informed that their knowledge would be tested both before the start of the course and subsequently on the final day after the end of the course. All participants agreed to the course. The pre-test took place on the first day of the course, after the initial formalities, before the start of classes. Course participants were under supervision and did not use any aids (notes, mobile phones, etc.). To match the pre-test and post-test results, the participants wrote their first names, length of experience and age in the recording sheet. Based on these data, the tests at the course’s beginning and end were identifiable.

The content of the test was consulted with the lecturer regarding content and expertise. The results of the final test were not used to evaluate the applicants. The final test by the lecturer was an oral exam. The following table shows the summary results of the participants from the pre-test and post-test; their point changes, in this case, increases and percentage success.

Pre-test		Post-test			
Average pre-test score	Average success rate	Average post-test score	Average success rate	Average point gain	Improvement index
10.77	69.78%	13.86	89.87%	3.09	1.29

Table 3: Knowledge results of participants in full-time teaching

In total, 27 participants again took part in the final testing. None of the test questions had to be dropped, and every participant in the course passed. All participants showed better knowledge in the post-test than in the pre-test. The improvement index was calculated as the ratio of the average percentage of success in the post-test and the pre-test and had a value of 1.29. The average point gain in the pre-test and post-test comparison was 3.09 points.

4 Discussion

Vocational training should provide students with additional knowledge to help their work performance. We assume that the participants’ understanding of the educational courses will be more profound after completing the course during the final testing than at the beginning. This fact was confirmed for us only in the case of education, which took place in a full-time

format. In the case of online education, the participants' knowledge at the final test was lower than at the beginning of the educational course. Furthermore, a different increase in learning can be observed even in the case of full-time teaching.

In the case of full-time teaching, it is necessary to consider that the lecturer of the 3rd course has more experience in the field and passed a pedagogic course compared to the lecturer of the 1st course.

Course participants were not allowed to use any note-taking devices or mobile phones in all cases of testing due to the objectivity of the testing. All tests were processed based on teaching materials and consulted with lecturers in terms of content and formality. This measure was so that participants could not complain that the testing content included questions that needed to be covered.

The participants knew that they were the subject of a research study. It can be assumed that this information will motivate them to perform better, and the Hawthorne effect will manifest in the course participants. This effect is used when improvement occurs due to self-observation and not due to changes in conditions (Průcha & Veteška, 2012, p. 114). The deterioration of results in the case of online education completely denies the phenomenon in this case.

The question remains why the participants of online education had worse results on the tests. In the pre-testing, the initial knowledge was verified online, and participants could share or obtain answers to questions, e.g., on the Internet or consult with their colleagues. This presumption can be supported by the fact that the entry values were higher for online education participants than for traditional teaching. There the initial values were lower. In the case of the final testing, the course participants no longer had the opportunity to cooperate and obtain the required information. Therefore, the output values are lower than in the case of the classic presence form of the course. This agrees with our survey (Zelníčková & Vorel, 2020) that addressed online education issues. We have compared high school students, university students and members of the customs administration. All three interviewed groups admitted to cheating in online learning, although they know that this phenomenon is incorrect, and that missing information will result in poor performance. (Zelníčková & Vorel & Sládek, 2021)

5 Conclusion

The paper deals with why, according to employees, taking educational courses at the customs administration does not benefit their work performance. Based on the research carried out, it was found that the form of full-time teaching is more effective than distance education, as the monitored sample experienced an increase in knowledge during full-time teaching. So far, the research has been carried out with three groups of participants. Two groups implemented full-time teaching, and one group of respondents completed distance learning. When comparing two groups of full-time teaching, it was found that the greater benefit of

knowledge was noted in the group where the teaching was carried out by a lecturer with more extended experience and pedagogical education compared to the other group. Considering this is a pilot investigation, the following research must be continued to confirm or refute the facts for different groups of students. We plan that such research investigations will take place in January 2023.

References

Bartoňková, H. (2010). *Firemní vzdělávání*. Praha: Grada, 2010. Vedení lidí v praxi.

Chráska, M. (2016). *Metody pedagogického výzkumu: základy kvantitativního výzkumu.* 2., aktualizované vydání. Praha: Grada. Pedagogika (Grada).

Koubek, J. (2015). *Řízení lidských zdrojů: základy moderní personalistiky.* 5., rozš. a dopl. vyd. Praha: Management Press.

Králová, A., & Novák J. (2014). *Teoretické aspekty racionalizace ekonomického vzdělávání: monografie*. Praha: Press21.

Mužík, J. (2010). *Řízení vzdělávacího procesu: andragogická didaktika.* Praha: Wolters Kluwer Česká republika, Vzdělávání dospělých (Wolters Kluwer).

Plamínek, J. (2014). *Vzdělávání dospělých: průvodce pro lektory, účastníky a zadavatele.* 2., rozšířené vydání. Praha: Grada Publishing.

Průcha, J., & Veteška J. (2012). *Andragogický slovník.* Praha: Grada.

Průcha, J. (2019) *Odborné školství a odborné vzdělávání: fungování systému, problémy praxe a výzkum*. Praha: Wolters Kluwer.

Vodák, J., & Kucharčíková. (2011). *Efektivní vzdělávání zaměstnanců.* 2., aktualiz. a rozš. vyd. Praha: Grada, Management (Grada).

Zelníčková, H., & Vorel D. (2020) *Fenomén podvádění při distanční výuce u žáků středních škol.* In VII. ročník Kuchárka kniha pre život, Edukačné súvislosti pravidiel v škole, Vysoká škola DTI.

Zelníčková, H., Vorel, D., & Sládek, P. (2021) Comparative Study: Distance Education of Students at Vocational Schools and of Members of the Armed Forces. In L. Gómez Chova, A. López Martínez, I. Candel Torres. INTED2021 Proceedings. Spain: IATED Academy, 2021. pp. 7357-7365. https://doi.org/j6gz.

Classroom Climate of first Year Students at a selected Secondary Vocational School after the Covid-19 Pandemic

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DOI: https://doi.org/10.53349/resource.2023.is1.a1206

Abstract

The paper addresses the issue of classroom climate after long-term online education in a selected vocational school. Long-term distance learning in the context of the Covid-19 pandemic has significantly affected the whole concept of education in the 2020/2021 school year. As a result of long-term distance learning, social bonding within classroom collectives has weakened, especially among first-year students at different school levels.
In the research part of the article, the results of a research investigation at the Secondary vocational School of Informatics, Postal Administration and Finance in Brno are presented. The research was focused on the quality of the classroom climate of selected first-year technical and non-technical fields of study. The findings show Covid-19 had an impact on the environment of the school classrooms studied. The research was carried out after students returned to full-time teaching in June 2021 Mareš & Ježek (2012). The questionnaire was used to conduct the research investigation about School Classroom Climate.

Keywords: School classroom climate, Social bonding, Distance learning

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1 Introduction

The Covid-19 pandemic caused the long-term closure of all types of schools, not only in the Czech Republic. Students were educated using various educational platforms (Zelníčková, Vorel & Marinič, 2021). Unfortunately, as a result, the group dynamics of school classes have been disrupted. The disruption of classroom dynamics has particularly affected students in the first year of secondary vocational schools.

The school classroom, specifically its climate, has a substantial impact on the education of students and strongly affects the development of social skills of all class members. Students acquire their position in the social group, in the classroom, over time (Kroupová, 2016, p. 301). However, this only applies if the students can meet in a school as part of their full-time education. Distance learning has limited adolescents' social contact. According to Portešová (2014, pp. 9-12), this does not lead to the harmonious development of the adolescent and may also endanger his/her mental health. The adolescent may transfer the problems caused in this way to the classroom after returning to full-time teaching.

The empirical part of the paper uses partial results of the Advanced master's state examination thesis of Zelníčková (2022), which dealt with the climate of first-year classes at the Secondary Vocational School of Informatics, Postal Administration and Finance in Brno, just after the return of students from long-term distance learning.

2 The Climate of the School Classroom

A school class is a unique social group that is formed based on predefined criteria (Výrost, Slaměník & Sollárová, 2019, p. 241). It is very important from the very beginning that students are required to follow the rules that are most often laid down in the school rules. However, students set their own internal norms even within the school community. According to Čapek (2008, p. 125), the climate of a school classroom can be characterized by its emotional and social mood. The development of good interpersonal relations is facilitated by school adaptation courses, which allow students to get to know each other. At the same time, the class teacher can get to know his/her students better.

The Covid-19 pandemic interrupted the familiarisation process and the natural evolution of the social climate in Czech school classrooms at the beginning of October 2021. The first year of high school can be considered a major milestone in a student's life. On entering secondary vocational school, the student's attention is diverted away from the family and focuses more on their peer group (Gillernová & Krejčová, 2012, p. 201). The adolescent spends most of his time at school. The quality of the classroom climate thus shapes his entire personality. Finding out the true state of the school classroom climate is complicated. That is because the school classroom is composed of students with different personalities, who have different statuses, and their families are from different socioeconomic backgrounds (Čapek,

2015, p. 545). Even a classroom teacher who knows his/her students perfectly can sometimes find it difficult to gauge the true state of his/her classroom climate.

For adolescents, diagnosing relationships in the classroom is problematic for another reason. Students no longer fully respect the authority of teachers and form different groups within the school classroom. They may also deliberately act against all the classroom rules to stand out personally. School classes of adolescents are conformist and often tolerant of various pathological phenomena within their group (Janošová, 2016, p. 315). Therefore, the main goal in studying the quality of the classroom climate is to capture the students' subliminal feelings and describe the existing interpersonal relationships. Mareš (1998, pp. 8-11) describes the following basic approaches to studying in the school classroom:

- *The sociometric approach* – focuses on the school class as a social group. It studies social relationships and their development. In this case, the SORAD questionnaire (based on the Czech words SOciometric-RAting Dotazník = mean questionnaire) is used as a research case.
- *Organizational-sociological approach* – the object of interest is the class teacher as the organizer of the teaching process and the school class as a unit. The method of research is standardized observation in pedagogical interaction.
- *Interaction approach* – the object of study is the interaction between teachers and students in the classroom. Standardized observation, video recordings and interaction analysis methods can be used to investigate this.
- *Educational-psychological approach* – the study focuses on the teacher and the school classroom. The subject of interest is the cooperation of students in the classroom. The research method is the "Classroom Life Instrument (CLI) assessment scale, (Mareš, 1998, p. 9)"
- *School-ethnographic approach* – the object of interest is the school classroom, teachers and school life. The research method is based on participant observation.
- *A developmental psychological approach* focuses on the student and the classroom as the social environment in which the student develops. The focus is primarily on the period between the 5th and 8th grades of compulsory schooling.
- *The social-psychological and environmentalist approach* – the classroom is seen as a place of education for students. Assessment scales are used as a research method to catch respondents' attitudes.

Partial results of Zelníčková's Advanced Master's state examination thesis research (2022), where a *social-psychological and environmentalist approach* was used, are published in this paper.

3 Empirical Part

In the following chapters of the paper, we will focus on identifying the quality of the classroom climate in the first-year classes of a selected vocational high school after the Covid-19 pandemic.

3.1 Main Research Problem

"What is the state of the school classroom climate in the classrooms of the selected secondary vocational schools after the Covid-19 pandemic from the perspective of the selected school classes?"

3.2 Characteristics of the Research Sample

The school classroom climate was studied at the Secondary Vocational School of Informatics, Postal Administration and Finance in Brno. The respondents were classroom teachers in the first year of technical or business and service fields. Due to the high number of first years at the school, the selection was narrowed to six classes and their teachers. The main intention was to create a diverse mix of classroom teachers according to their length of teaching experience, gender and willingness to participate in our research. Another criterion for selecting a classroom teacher was that the classroom teacher must have taught at least one subject in his/her school classroom. The research included the first year of engineering programmes students (SŠIPF, 2022):

- *Data security* – a four-year study programme (ISCED 1997 3A) with a school-leaving exam (in Germany mean Abitur).
- *Intelligent networks and devices* – three-year course (ISCED 1997 3C).
- *Information and security technologies* – a four-year study programme (ISCED 1997 3A) of study with a high school diploma and teaching.

At the same time, the first years focused on business and services (non-technical fields) were included in the research (SŠIPF, 2022):

- *Logistics and transport* – a three-year field of study (ISCED 1997 3C).
- *Logistics* – a four-year study programme (ISCED 1997 3A) with a school-leaving exam (in Germany mean Abitur).
- *Banking and insurance* – a four-year study programme (ISCED 1997 3A) with a school-leaving exam (in Germany mean Abitur).

The research was conducted in early June 2021, immediately after students returned to school after distance learning. The research was also implemented with regard to the continuously changed regulations of the government of the Czech Republic in the field of distance and full-

time education. We also considered the difficulty of students' adaptation to full-time teaching and the school-leaving exam. The procedure of research implementation was re-evaluated several times. Due to the overload of teachers and reduced willingness to cooperate in the research, the method of interviewing class teachers was abandoned during the implementation of the research and an electronic questionnaire was left to be distributed among the students.

3.3 Research Instrument Design and Hypothesis Formulation

Mareš & Ježek's (2012) questionnaire was chosen as the research instrument for interviewing students, focusing on identifying the quality of eleven psychosocial aspects related to classroom climate. The main advantage of Mareš & Ježek's (2012) questionnaire is its wide applicability ranging from second-grade primary school pupils to secondary vocational school students. Mareš & Ježek (2012) based the questionnaire on the existing MCEI (Carroll, 2006) and WIHIC (Fraser, McRobbie & Fisher, 1996) questionnaires.

The Multicultural Classroom Environment Instrument (MCEI) is a questionnaire that measures the multicultural environment of the school classroom (Caroll, 2006) and the WIHIC Questionnaire, is currently one of the most cited questionnaires that provides information about the educational environment. The questionnaire contains seven of the eight scale items (Scordi & Fraser, 2019).

Mareš & Ježek (2012, p. 15) questionnaire is organized into 7 mandatory subscales, which contain a total of 34 mandatory questions. In addition, the questionnaire contains a total of 4 optional subscales with 19 mandatory questions. To evaluate the questionnaire, it is necessary to calculate the individual scale scores of a certain scale for each student. Scores for the entire class are calculated by determining the median scaled scores obtained from the scaled scores of individual students.

The quality of the school classroom climate is evaluated by a final comparison of the median scale values according to a table created by the authors of the questionnaire (Mareš & Ježek, 2012), which is based on their own research. We evaluated each subscale separately, as each one has its own specific values (Mareš & Ježek, 2012, pp. 21-23).

3.4 Interpretation of Results

Considering the research goals and the structure of the questionnaire, a total of seven sub-research questions and seven hypotheses were formulated. The paper will publish the results of two partial research questions and a total of five hypotheses.

First research question PRQ1: What is the rapport of first-year students after distance learning?

Hypothesis H1: After long-term distance learning, first-year males have a better rapport with their classmates than females.

The hypothesis was based on Vágnerová's (2012, p. 431) findings describing differences in the number of friends by gender. Vágnerová (2012, p. 431) states that men have more friends. Wagner reports that a total of 77% of older male adolescents reported having 5 or more friends. For women, the number is lower, but their relationships are deeper. As first-year students are in the transition period between puberty and younger adolescence, it is likely that they bring some behavioural patterns from their earlier years of life. In addition, boys mature later and the period of older puberty extends until the age of 15, the age at which students enter their first year of secondary (vocational) school (Gecková & al., 2000 in Langmeier & Krejčířová, 2006, p. 143). Given the number of male friends, it can be assumed that men will relate better and faster to other classmates.
The null and alternative hypotheses were established before evaluating the obtained data:

Null hypothesis H10: Gender does not affect the quality of classmates' relationships after long-term distance learning.
Alternative hypothesis H1A: After long-term distance learning, first-year males have better relationships with their classmates than females.

The Cronbach's alpha coefficient value is $\alpha = 0.79$ and is in the range of statistically acceptable values. The value of Cronbach's coefficient from the original research by Mareš & Ježek (2012) is $\alpha = 0.86$, which is already considered an optimal value. The degree of freedom df = 2 was set based on the calculations. The critical chi-square value is $\chi^2_{crit} = 5.991$. The value of the test criterion that was calculated ($\chi^2_{calc} = 2.147$) is lower than the critical Chi-square value. The calculated value of $p_{calc} = 0.342$ is higher than the critical significance level of $p_{crit} = 0.05$. After comparing all the calculated values, it can be concluded that the alternative hypothesis H1A is rejected, and the *null hypothesis H10 is accepted.*

Result for Hypothesis H1: Gender does not affect the quality of relationships between classmates after long-term distance learning.

Hypothesis H2: After a long period of distance learning, first-year females make a greater effort to ingratiate themselves with their classmates than males.
The hypothesis was formulated based on the findings of Langmeier & Krejčířová (2006), who state that sexual identity is achieved in adolescence and adolescents try to accept the role of women and men in society. Girls are thus subjected to strong social pressure as they try to fulfil the role of adult women. Boys are less pressured to fulfil the male role and thus gain a social advantage compared to girls (Janošová, 2008, p. 210). Based on the above facts, it can be assumed that girls under the impact of social pressure will exert high peer pressure to please their classmates in the school classroom.
The null and alternative hypotheses were established before evaluating the obtained data:
Null hypothesis H20: The gender of the respondent does not affect his/her efforts to please his/her surroundings.

Alternative hypothesis H2A: After a long period of distance learning, first-year females make greater efforts than males to ingratiate themselves with their classmates.
The value of Cronbach's alpha coefficient is $\alpha = 0.74$ and is comparable to the value made by Mareš & Ježek (2012). The value of α is within the range of statistically acceptable values. The value of the original research by Mareš & Ježek (2012) was $\alpha = 0.73$. The degree of freedom df = 2 was set based on the calculations. The critical chi-square value is $\chi^2_{crit} = 5.991$. The value of the test criterion that was calculated ($\chi^2_{calc} = 2.115$) is lower than the critical Chi-square value. The calculated value of $p_{calc} = 0.347$ is higher than the critical significance level of $p_{crit} = 0.05$. After comparing all the calculated values, it can be concluded that the alternative hypothesis H2A is rejected, and the *null hypothesis H20 is accepted*.

Result: The gender of the respondent does not influence his/her efforts to please his/her surroundings.

Hypothesis H3: Technically oriented students have better relationships with their classmates than business and service students.
The hypothesis was formulated based on Macek's (2003) assertion that peer conformity increases in importance in early to middle adolescence. The adolescent seeks prestige and wants to be accepted by the social group. Friendship among boys is collective and is oriented towards common hobbies and interests. Zelníčková's Advanced Master's state examination thesis (2022) formulates a hypothesis based on the fact that technically oriented majors are perceived as prestigious at the selected secondary vocational school. Boys predominate in the first years of the technical fields studied, compared to the business and service fields, where the groups are heterogeneous in terms of gender composition.
The null and alternative hypotheses were established before evaluating the obtained data:
Null hypothesis H30: Respondents' field of study does not affect the intensity of their relationships with classmates.
Alternative hypothesis H3A: Technically oriented students have better relationships with their classmates than business and service students
The Cronbach's alpha coefficient value is $\alpha = 0.79$ and is in the range of statistically acceptable values. The value of Cronbach's coefficient from the original research by Mareš & Ježek (2012) is $\alpha = 0.86$, which is already considered an optimal value. The degree of freedom df = 2 was set based on the calculations. The critical chi-square value is $\chi^2_{crit} = 5.991$. The value of the test criterion that was calculated ($\chi^2_{calc} = 2.115$) is lower than the critical Chi-square value. The calculated value of $p_{calc} = 0.347$ is higher than the critical significance level of $p_{crit} = 0.05$. After comparing all the calculated values, it can be concluded that the alternative hypothesis H3A is rejected, and the *null hypothesis H30 is accepted.*

Result: respondents' field of study does not affect the intensity of his/her relationships with classmates.
All hypotheses (H1, H2, H3) formulated in PRQ1 were rejected.

The studied disciplines do not disturb students' relationship after distance learning. The natural development of school classes as small social groups is probably delayed.

Second research question PRQ2: Has long-term distance learning affected students' approach to learning?

Hypothesis H4: First-year students in Business and Services exert more effort in learning than students in technically oriented fields.

The hypothesis was based on the findings of Vokál, Šmahel & Dědková (2021, p. 2). Vokál, Šmahel & Dědková, in their research on adolescents' excessive use of the Internet during Covid-19 found that adolescents spent more time on the Internet during distance learning. However, the number of adolescents spending 7 hours or more online has doubled. Zelníčková (2022) assumes that students who study technically oriented fields focusing on IT technologies spend more time with smart technologies, also thanks to distance learning. Therefore, they do not need to make an increased effort to learn because even in their free time, they acquire the necessary knowledge and skills to complete the learning. Compared to students from technically oriented fields, business and service-oriented fields such as logistics and banking have to make a higher effort to learn.

The null and alternative hypotheses were established before evaluating the obtained data:

Null hypothesis H40: Respondents' field of study does not affect their learning efforts.

Alternative hypothesis H4A: First-year students in the Business and Service fields exert a higher effort in learning than technically oriented students.

The Cronbach's alpha coefficient value is $\alpha = 0.87$ and is in the range of statistically acceptable values. The value of Cronbach's coefficient from the original research by Mareš & Ježek (2012) is $\alpha = 0.86$. The degree of freedom df = 2 was set based on the calculations. The critical chi-square value is $\chi^2_{crit} = 5.991$. The value of the test criterion that was calculated ($\chi^2_{calc} = 0.483$) is lower than the critical Chi-square value. The calculated value of $p_{calc} = 0.785$ is higher than the critical significance level of $p_{crit} = 0.05$. After comparing all the calculated values, it can be concluded that the alternative hypothesis H4A is rejected, and the *null hypothesis H40 is accepted.*

Result: Respondents' field of study does not affect their learning efforts.

Hypothesis H5: Students in the first year of Business and Services are more proactive in their studies after transitioning from distance to full-time education than students in technical fields.

The hypothesis was based on Zelníčková, Vorel & Sládek's (2021, p. 7362) findings that students procrastinate during distance learning. This may lead to demotivation of students and their slacking off in schoolwork. Because business and service students do not have the opportunity to use their vocational skills practically, as do students in technically oriented fields, they will likely have to take more initiative in full-time learning.

The null and alternative hypotheses were established before evaluating the obtained data:

Null hypothesis H50: Respondents' field of study does not affect their initiative in studying
Alternative hypothesis H5A: First-year students of the Business and Services field of study are more proactive in their studies than those of the technical field after transitioning from distance to full-time education.
The value of Cronbach's alpha coefficient is $\alpha = 0.67$ and is in the range where the results of Cronbach's alpha coefficient are weak. The value from the original research by Mareš & Ježek (2012) is $\alpha = 0.71$ and is in the acceptable range. The degree of freedom df = 2 was set based on the calculations. The critical chi-square value is $\chi^2_{crit} = 5.991$. The value of the test criterion that was calculated ($\chi^2_{calc} = 3.590$) is lower than the critical Chi-square value. The calculated value of $p_{calc} = 0.166$ is higher than the critical significance level of $p_{crit} = 0.05$. After comparing all the calculated values, it can be concluded that the alternative hypothesis H5A is rejected, and the *null hypothesis H50 is accepted*.

Result: respondents' field of study does not influence their study initiative.
All hypotheses that were formulated under PRQ2 were rejected.

This is also confirmed by the results that were evaluated for the respondents.
It can be stated that long-term distance learning has negatively affected the students' overall approach to studying.

4 Discussion

A total of 120 questionnaires were distributed in the study. Altogether 103 valid questionnaires were received for processing. The return rate is 85.8%. The main limitation of the whole research was its local narrowness to one secondary vocational school. Specifically, Secondary Vocational School of Informatics, Postal Administration and Finance in Brno. The main goal of the research was to determine the state of classroom climate after long-term distance education.

Several studies confirm the negative effects of long-term distance learning on education and the psyche of teachers and students. Prokop & Marková (2020) study parents' opinions about distance learning. Bicanová, Gargulák & Prokop (2021) describe teachers' experiences with distance learning, and research by Bicanová, Kobrhel, Gargulák & Prokop (2021) focuses on the impact of the pandemic Covid-19 on students. All selected researches describe the direct experience of all actors in the educational process.
The evaluation of our research found that *students do not have disturbed relationships, and no differences in gender relations arise*. In this case, it can be assumed that social contact (albeit limited) between students via educational platforms could have positively impacted the outcome. Bicanová, Kobrhel, Gargulák & Prokop (2021) published the findings of their research where it was found that only 26% of primary school pupils reported a deterioration in their relationships with their classmates.

After evaluating the data obtained, it was further found that there were *no significant differences in access to study according to the field of study.* According to research by Prokop & Marková (2020), respondents tended to procrastinate during their studies and exert little activity in their studies. This was confirmed by parents who observed their children during distance learning. Up to 77% of parents admitted that their child was less motivated to study during distance learning. This is related to the experience of teachers after distance learning, who states that it is crucial to support students' motivation after their return to school (Bicanová, Gargulák & Prokop, 2021). As many as 77% of teachers reported that restoring students' initiative to learn would be crucial when they returned to school.

Based on the facts, it is possible to create an approximate plan for pedagogical intervention. It is crucial to bring discipline back to students through external action and create a state where students are forced to work on their personal discipline. This can translate into better study results later on, as well as the quality of the school climate.
Our research has only confirmed the necessity to create an extensive national survey targeting second-grade primary school pupils and first-to-third-year secondary school students.

5 Conclusion

Long-term distance learning did not allow students to be present in person at school and thus deprived them of many beautiful moments with their classmates. While this form of teaching allowed for the transfer of knowledge to students, it eliminated the crucial social contacts for adolescents. After evaluating all the sub-research questions and related hypotheses, it can be concluded that students themselves do not experience relational problems after distance learning. However, the low motivation of students to do schoolwork is very problematic, as is the low initiative to study.

Thanks to Covid-19, all participants in the educational process passed the stress test. Nowadays, it is necessary to make students work hard to fill in their missing knowledge and skills. These skills and knowledge need to be built systematically. Unfortunately, they cannot be built simultaneously in all subjects taught. Therefore, a new challenge is opening for the Czech education system, which will shape the next generation of students entering secondary vocational schools. Covid-generation comes to secondary vocational schools.

References

Bicanová, J., Gargulák, K., & Prokop, D. (2021). *Zkušenosti českých učitelů s distanční výukou* [Online]. In [Online]. https://drive.google.com

Bicanová, J., Kobrhel, V., Gargulák, K., & Prokop, D. (2021). *Dopady pandemie covid-19 na žáky* [Online]. PAQ Research and Kalibro Projekt s.r.o. https://drive.google.com/file

Carroll, M. J. (2006). *An Investigation into Students' Perceptions of Multicultural Classroom Environment in Queensland Catholic Secondary Schools* (Doctoral Dissertation). Virginia: Australian

Čapek, R. (2008). *Odměny a tresty ve školní praxi*. Prague: Grada. Teacher and parent: Cooperation, class meeting, communication

Čapek, R. (2015). *Moderní didaktika: lexikon výukových a hodnoticích metod*. Prague: Grada.

Fraser, J. B., McRobbie, C. J. & Fisher, D. L. (1996). *Development, Validation and Use of Personalnd Class Form a New Classroom Environment Instrument*. New York: Annual Meeting of the American Educational Research Association

Gillernová, I., & Krejčová, L. (2012). *Sociální dovednosti ve škole*. Prague: Grada.

Janošová, P. (2008). *Dívčí a chlapecká identita: vývoj a úskalí*. Praha: Grada.

Janošová, P. (2016). *Šikana a školní třída na začátku dospívání*. In P. Janošová, L. Kollerová, K. Zábrodská, J. Kressa, & M. Dědová, Psychologie školní šikany (pp. 307-337). Praha: Grada Publishing.

Kroupová, K. (2016). *Slovník speciálněpedagogické terminologie: vybrané pojmy*. Praha: Grada

Langmeier, J., & Krejčířová, D. (2006). *Vývojová psychologie* (2nd updated ed.). In (2nd updated ed.). Prague: Grada Publishing.

Macek, P. (2003). *Vývojové změny v adolescenci ve světle novějších empirických výzkumů* [Online]. https://nakladatelstvi.portal.cz

Mareš, J. (1998). *Sociální klima školní třídy (Přehledová studie).* Hradec Králové.

Mareš, J., & Ježek, S. (2012). *Klima školní třídy: dotazník pro žáky*. Praha: Národní ústav pro vzdělávání.

Portešová, Š. (2014). *Rozumově nadaní studenti s poruchou učení: cesty od školních výkonových paradoxů k úspěchu*. Brno: Masarykova univerzita.

Prokop, D., & Marková, L. (2020). *Distanční vzdělávání na jaře a podzim 2020: Pohled rodičů* [Online]. Retrieved September 11, 2022, https://www.ucitelnazivo.cz

Skordi, P., & Fraser, B.J. (2019). *Validity and use of the What Is Happening In this Class*? (WIHIC) questionnaire in university business statistics classrooms. *Learning Environments Research, 22* (2), 275–295. https://doi.org/10.1007/s10984-018-09277-4

SŠIPF Brno. (2022). *Studijní obory* [Online]. Retrieved October 12, 2022, Secondary Vocational School of Informatics, Post and Finance Brno website: https://www.cichnovabrno.cz/uchazeci/studijni-obory

Vágnerová, M. (2012). *Vývojová psychologie: dětství a dospívání* (Second Edition, Completed and Revised). In (Second edition, supplemented and revised). Prague: Karolinum.

Vokál, D., Šmahel, D., & Dědková, L. (2021). *Excesivní používání internetu českými dospívajícími: Srovnání před a během pandemie covid-19*. [Research report]. Masaryk University.

Výrost, J., Slaměník, I., & Sollárová, E. (2019). *Sociální psychologie: teorie, metody, aplikace*. Prague: Grada.

Zelníčková, H., Vorel, D., & Marinič, P. (2021). *Využití Microsoft 365 technologií při výuce ekonomických předmětů na střední odborné škole* [Online]. In M. Klement & kol., Trendy ve vzdělávání (45). https://doi.org/j6g7

Zelníčková, H., Vorel, D., & Sládek, P. (2021). *Comparative study: Distance edu-cation of students at vocational schools and of members of the armed forces*. In L. Gómez Chova, A. López Martínez, & I. Candel Torres, INTED2021 Procee-dings (7357-7365). Spain: IATED Academy.

Zelníčková, H. (2022). *Klima školní třídy prvních ročníků střední odborné školy po distančním vyučování – covid-19* (Rigorous theses = Advanced Master's state examination thesis). Brno.

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ISSN 2313-1640

Die vierte Ausgabe von R&E-SOURCE im 10. Jahrgang des Journals widmet sich dem Thema
transformation.lernen
Einreichungen sind bis 31. Juli 2023 herzlich willkommen unter
https://journal.ph-noe.ac.at/index.php/resource/about/submissions
Erscheinungsdatum: 15. Oktober 2023