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Vocational interests of the winners of the technical creativity contest

Zainteresowania zawodowe laureatów konkursu twórczości technicznej

Słowa kluczowe: zainteresowania zawodowe, konkurs twórczości, twórczość techniczna, szkoła wyższa.

Streszczenie: W artykule opisano cele, przebieg oraz wyniki konkursu twórczości technicznej, który jest organizowany od 2005 roku przez Uniwersytet Rzeszowski. Dokonano analizy kategorii „zainteresowanie" oraz „zainteresowanie zawodowe", ukazując niedostatki aktualnych podejść. Sformułowano definicję operacyjną „zainteresowań zawodowych", z której wywiedziono cechy zainteresowań: siłę, trwałość, głębokość i szerokość. Rozważania teoretyczne dopełnione zostały badaniami zainteresowań zawodowych laureatów konkursu twórczości technicznej. Przeprowadzone badania na 45-osobowej grupie laureatów konkursu świadczą o wysokim poziomie zainteresowań zawodowych (dobrze rozwiniętych zainteresowaniach indywidualnych, zamiłowaniach), w czasie studiów i po ich ukończeniu. Badania mogą być wykorzystane w modernizacji narzędzi badań zainteresowań oraz w doskonaleniu procesu kształcenia realizowanego w szkołach wyższych.

Key words: interests, professional interests, creativity contest, technical creativity, university.

Abstract: The paper aims at presenting the goals, course and results of the technical creativity contest which has been organized since 2005 by the University of Rzeszów. The categories "interest" and "professional interest" have been analyzed, revealing the shortcomings of current approaches. An operational definition of "professional interests" has been formulated, from which the characteristics of interests such as strength, permanence, depth and breadth have been derived. Theoretical considerations have been complemented by research on the professional interests of the winners of the technical creativity contest. The research conducted on a group of 45 contest winners proves a high level of professional interests (well-developed individual interests, pastimes), during and after graduation. The research can be used for the modernization of interest research tools and to improve the education process carried out at universities.

Introduction

In the whole variety of forms, ways and means of university education, there are non-obligatory activities, undertaken spontaneously, which, not fitting into standard organizational solutions, play an important role in increasing the effectiveness of education (Amundsen & Wilson 2012; Astin 1984; High level... 2014; Kaur and Bhalla

2018; Pascarella 1980; Roulin & Bangerter 2013; Tight 2020). One of the forms of supporting the educational process is the technical creativity contest organized since 2005 by the University of Rzeszów. This significant period in running the contest encourages reflection on its usefulness and its place in the development of vocational interests of its winners and participants.

Vocational interest as an educational category (concept) has a rich semantic context, going beyond the operational definitions currently used in vocational guidance, focused primarily on the categorization of interests. The discrepancy between the needs of research and the current methodological position is particularly noticeable when examining the interests of students in a specific field of knowledge or examining the interests of those working in a narrow activity.

The undertaking and implementation of the research was guided by two goals of a cognitive and methodological nature. The first included the analysis of the existing approaches to define vocational interests and the development of an operational definition enabling the study of their broader semantic layer. The second objective was to identify and compare the vocational interests of the winners of the technical creativity contest during their studies and after they start their professional career.

Information about the Technical Creativity Contest

The idea to organize the contest arose from the observation of the activity of selected students, which went far beyond the framework of standard didactics, and even classes such as: laboratories, design classes, seminars, or activities of students research groups did not create full conditions for the development of technical skills and creative attitudes (Schank and Childers 1988; Marszałek 2022).

In 2004, in the Department of Electronics Didactics of the Institute of Technology at the University of Rzeszów the organizing committee of the contest was constituted, which developed its objectives, goals, regulations, criteria and evaluation sheets, as well as the all procedure. The main objectives of the contest are contained in the following formulations: stimulation of the technical creative activity of students; promotion of technical culture; inspiring students to acquire knowledge and practical skills; development of technical and vocational interests; creating conditions to achieve satisfaction from the implementation and presentation of one's own ideas; enabling students to conduct noble contest.

Over 15 years (from 2005 to 2019), 146 people participated in the contest. They all submitted 135 works. Fig. 1 shows the number of participants in the contest broken down by year.

In 2005, 2 people entered the contest, and in 2006 the number of entries increased to 7. In the following years, 6 people took part in the contest, in 2007, and 4 people in 2008. Since 2009, the number of participants has normalized at the level of 8 to 15 people.

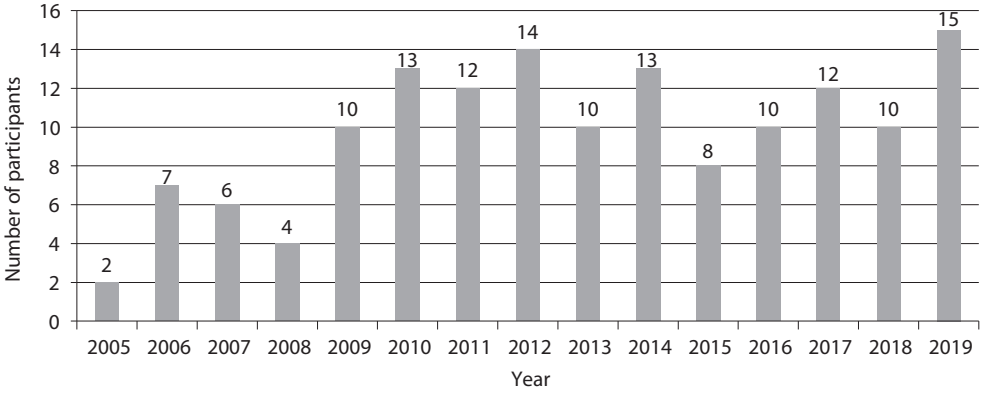

Fig. 1. Participation of students in the contest in particular years

The great educational value of the technical creativity contest has been noticed, appreciated and developed by other people and institutions in Poland and abroad. Since 2015, the Łódź Teacher Training Center, on the initiative of Jan Moos, has been organizing a nationwide contest of technical creativity for primary and secondary school students (Gnatkowska 2018), in 2018 at the State East European School in Przemyśl, dr Stanisław Szabłowski joined the organization of a technical contest for students of secondary schools (Szabłowski 2019), and in 2008 at the West Bohemian University in Plzeň, dr Petr Mach initiated an annual international technical contest for students from different countries (Mach 2020).

Vocational interests – mature interests focused on content

Interest research has been conducted for over a one hundred and twenty years. Initial work focused on identifying developmental changes in children's interests and on the interests of students, the so-called school interests (cf. Gurycka 1978; Hidi and Renninger 2020; Marszałek 2022; Parzęcki 2003). The second trend of research, which emerged from the need to take into account a wide spectrum of personal dispositions and inclinations in the decision-making process aimed at the optimal choice or change of profession, focuses on vocational interests as a category different from school interests. The words of D.E. Super are significant here: "you can trust interests discovered only at the age of eighteen, the so-called inventoried-vocational interests" (1964; cf. Stoll et al. 2021; Low et al. 2005).

The beginnings of exploring this issue date back to the 1920s. The pioneer of vocational interest research was E.K. Strong, who assumed that people in the same or similar jobs had common interests that distinguish them from people in different jobs (1927). The similarity of interests applies not only to professional areas, but also to many aspects of non-professional life. The *Strong Vocational Interest Blank* contains several hundred questions about occupations, school and university subjects, pastimes and favorite activities, and psychosocial characteristics. The

tool allows for separation of realistic, research, artistic, social, entrepreneurial and conventional interests.

A different method of researching interests was proposed in 1939 by F. Kuder (*Kuder Preference Record Vocational*). The study consisting in selecting one of the listed pairs of activities made it possible to measure the activities preferred by the respondents in seven spheres: scientific, accounting, artistic, musical, literary, social and persuasive, and since 1946 additionally in three spheres: mechanical, office and outdoors (Zytowski 1992).

The currently used tools for researching vocational interests, which include, among others, improved versions of questionnaires by E.K. Strong and F. Kuder and the *Vocational Preference Inventory* by J.L. Holland (1985, 1992; Nosal i inni 1997), the *Personal Globe Inventory* by T.J.G. Tracey (1997), the *Jackson Vocational Interest Survey* (Jackson 2000), *Youth Questionnaire of Vocational interests* by A. Paszkowska-Rogacz (2011) or the *Vocational Pictures Test* by M. Achtnich (1994; Jarosiewicz 2013) and *Multilingual Iconographic Professional Interest Inventory* (Boerchi & Magnano 2021) allow determining the content of professional inclinations and interests. Thus, they are widely used in vocational guidance, whose theoretical basis was developed by F. Parsons (1909). Getting to know yourself, including your interests, is one of the three factors – next to knowledge about the requirements and working conditions and considering the relationship between the two factors – determining the optimal choice of profession. This approach – characteristic of vocational guidance in an industrial society, is present in a significant percentage of counselling practice today (Baker 2009; Bajcar et al. 2006), and along with new concepts (models) by D. Super (1951), Holland (1992), D. Prediger (1999) contributes to the high popularity of the above-mentioned tools for measuring interests and developed on their basis. The presented research tools – meeting the basic methodological criteria – will not be useful or will only play an auxiliary role in the study of a number of pedagogical and, in a broader sense, social problems. What I mean here is the study of students' interests in a specific field of knowledge, the study of students' interest in a given field of study or the study of the interests of employees working in a specific, narrow activity.

An attempt to define vocational interests

Another methodological discrepancy can be noticed in the so-far research of interests. On the one hand, in the literature on the subject, the category of "vocational interests" is given a broad meaning that partly combines employee qualifications, abilities and motivation to work (cf. Dąbek 1987; Gurycka 1978; Schermer 2020; Schultz & Schultz 2010; Silvia 2001; Super 1964). On the other hand, the methodological practice of researching vocational interests (inclinations) and, at the same time, operational definitions focus only on a narrow section of the phenomenon, basically allowing the exploration of one feature of interests.

There is general agreement that vocational interests are one of the most enduring and compelling areas of individual difference (Low et al. 2005; Lubinski & Dawis, 1995) and the most common means of characterizing, comparing and matching people and environments (Hogan & Blake 1996; Rounds at al. 2014).

If we assume that vocational interests are a mental property (personal disposition), which manifests itself in a relatively permanent desire of an individual to know and act in a specific area of professional activity and experiencing feelings related to this activity (cf. Super 1964; Gurycka 1978; Marszałek 2001; Schermer 2020), the consequence of this will be the need to use a whole range of techniques and research tools to determine them.

Vocational interests understood in this way differ in terms of: content, breadth, strength, depth and durability (cf. Fryer 1931; Dąbek 1987; Gurycka 1978; Marszałek 2022; Rounds at al. 2014; Schermer 2020). The content of interests can be identified with the object of cognition, the area of professional activity. In terms of content, vocational interests can be divided into: technical, educational, musical, artistic, IT, biological, medical and others. The multiplicity of objects of cognition is associated with the next feature – the breadth (range) of interests. The more objects of knowledge are in the sphere of human interest, the wider the interests are. The strength of the interest can be determined by the emotional attitude towards the object of interest. This feature allows the separation of strong, average and weak interests. The frequency of cognitive acts occurring in relation to the object of interest per unit of time can be related to the intensity (depth) of interest. Persistence is expressed in the length of time for which interests are manifested.

The application of the presented operational definition of vocational interests creates a methodological basis for the selection or construction of own research tools. Determining individual characteristics of interests is impossible using only standard interest questionnaires, which allow the selection of interests categorized in terms of content, or the measurement of the strength of interests or professional inclinations. The way out of this unfavorable – from the methodological point of view – situation is the use of various methods and techniques of examining vocational interests, used autonomously or supplementing the survey, such as observation (Fryer 1931; Super 1964; Gurycka 1978), conversation (loose statements) "interests expressed" (Darley, Hagenah 1955; Dolliver 1969; Silvia 2001, an analysis of documents and products (Marszałek 2022, Dąbek 1987; Schermer 2020), an interview (Fryer 1931; Silvia 2001).

A comprehensive study of vocational interests is of great importance for the individual development of people, and for the creators of educational activities. The research results make it possible to verify the accuracy of the choice, determine the specificity, strength, intensity (depth), breadth, durability and variability of the direction of vocational interests. The measurement of the mentioned characteristics of interests also plays an important role in the self-definition of an individual – the assessment of one's own professional dispositions, the possibility of their

development and – so useful nowadays – self-reflection, self-definition, self-diagnosis leading to success in professional work. With regard to the creators of changes in the reality of vocational education, a comprehensive study of vocational interests allows the verification of assumptions regarding the content and directions of education, modernization of methods and forms of work organization that can be transformed into measurable indicators of the effectiveness of education policy.

Theoretical assumptions of research

The solution to the main research problem consisted in answering the question: What vocational interests did the winners of the technical creativity contest show during their studies and are they currently showing them during their professional activity? From the main problem formulated in this way, a bunch of detailed problems emerged, which concerned: durability, strength and depth of interests. The research also created an opportunity to collect information on the assessment of the usefulness of the technical creativity contest by the winners.

A questionnaire and an interview were the tools enabling the collection of research results. The questionnaire – next to the instructions and details – contains questions grouped into 3 thematic sections: educational path, interests and technical creativity contest. The educational path section contains questions about specifying the names of schools along with the year of starting and completing education. The interest section included questions about the content, strength, persistence, and depth of vocational interests. In the third section, there are questions regarding the usefulness, evaluation of the organization and proposals for modifying the content and organization of the technical creativity contest.

At the research design stage, four indicators of research variables were adopted: the intensity of interest indicator, the intensity (depth) indicator, the persistence indicator and the level indicator (synthetic). The indicator of the strength of interest in the given content of education refers to the respondents' choice of emotional attitude to the given content and is assessed on a scale from 0 to 3. The obtained value of the indicator allows dividing the interests into three groups: weak interests – with the index from 0.1 to 1.1 ; medium-strong interests – from 1.1 to 2.1 and strong – from 2.1 to 3. The intensity (depth) indicator was defined as the number of hours per week devoted by the examined person to the development of interests. This indicator makes it possible to differentiate interests into three groups: deep with an indicator of more than 5 hours/week, medium-depth – from 1 to 5 hours/week. and shallow less than 1 hour weekly. The durability indicator was the number of years in which a given person is interested in specific content. According to this feature, vocational interests were divided into three groups: long-term interests – over 5 years, long-term interests – from 1 to 5 years, short-term interests (curiosities) – less than 1 year. The synthetic indicator is an auxiliary indicator synthesizing the value of three indicators.

Implementation of research and characteristics of the surveyed people

The research was carried out in 2020–22. In order to collect the results, a paper version and an electronic version (on-line) of the questionnaire and interview were used. 109 questionnaires were sent electronically and conventionally to the winners of the 2005–2017 contest. 45 correctly completed questionnaires were received (general return rate 41%). The validity of the research tool was ensured by the convergence of the questionnaire questions with the adopted research indicators (defined characteristics of interests). The reliability of the questionnaire as expressed by Cronbach's alpha coefficient is 0.93 (Cronbach, 1951; Taber 2018).

Among the surveyed people, there were 38 men (87% of all surveyed) and 7 women (13%). The surveyed contest winners mostly came from the urban environment – 28 (62%) of the respondents, and 17 (38%) of the respondents – from the rural environment. 12 people (27%) came from small towns, 5 students (11%) from the medium-urban environment, and 11 people (24%) from the big city.

Research results

Each of the surveyed persons was characterized by an individual educational path. Nevertheless, there are many regularities in statistical summaries.

28 respondents (62% of the total number of respondents) were graduates of secondary vocational schools, and 17 (38%) of general education schools. Four of the surveyed persons completed uniform master's studies, one person completed education at the level of bachelor's studies, the remaining persons completed 1st and 2nd degree studies.

The largest number – 30 people (67%) graduated from first-cycle studies or uniform master's studies in the field of technical and IT education, 7 people (16%) – art education, 6 people (13%) – mechatronics and one person each (2%) from in the field of agricultural mechanization and pedagogy.

Most often, graduates of first-cycle studies chose the same field of study for their second-cycle studies. Two people who graduated from the field of technical and IT education chose the field of materials engineering for their second degree.

All vocational interests of the respondents were assigned to 12 thematic groups: 1) materials science, 2) machine science, 3) manufacturing technology, 4) electronics, 5) IT, 6) automatics, 7) automotive, 8) agriculture, 9) computer graphics, 10) sculpture, 11) painting, 12) education.

The largest number of respondents (tab. 1, fig. 3) are interested in computer science (20 people, which is 44% of the respondents), followed by: materials science (19 people – 42%), technology (17 respondents – 38%), electronics (13 people – 29%), computer graphics and automation (12 people each – 27%), mechanical engineering (11 people – 24%). A large group of respondents are interested in the automotive

industry (10 respondents – 22%), painting and education (7 respondents – 16%). Among the surveyed laureates, interest in sculpture (4 people – 9%) and agriculture (3 people – 7%) are the least represented among the surveyed laureates.

When considering interests in terms of features (tab. 1, fig. 4), many regularities are revealed. All interests are characterized by a high degree of development – the average synthetic coefficient is – i_N=2.55, and for individual interests it ranges from 2.16 to 2.83.

Table 1. Interests of students in the last year of studies – summary table (marking: strength: 3 – strong interests, 2 – moderately strong interests, 1 – weak interests, iS – strength indicator; durability: 3 – long-term, 2 – permanent, 3 – short-term, iD – durability index, L – time of displaying interests, depth: 3 – deep interests, 2 – medium-depth interests, 1 – shallow interests, iE – depth index, h – number of hours devoted to the development of interests in a week, iN – index synthetic)

No.	Content of interest	Number of people	Strenght				Durability					Depth					iN
			3	2	1	iS	3	2	1	iD	L year	3	2	1	iE	H hour	
1	Materials science	19	9	7	3	2,32	5	13	1	2,21	3	9	10	0	2,47	8	2,33
2	Machine science	11	6	4	1	2,45	8	1	2	2,55	14	9	2	0	2,82	5	2,61
3	Manufacturing technology	17	7	7	3	2,24	4	11	2	2,12	3	7	5	5	2,12	4	2,16
4	Electronics	13	10	1	2	2,62	8	5	0	2,62	10	11	1	1	2,77	16	2,67
5	IT	20	15	5	0	2,75	14	6	0	2,70	9	11	8	1	2,50	10	2,65
6	Automatics	12	6	6	0	2,50	3	9	0	2,25	10	5	7	0	2,42	4	2,39
7	Automotive	10	5	5	0	2,50	7	3	0	2,70	9	4	5	1	2,30	3	2,50
8	Agriculture	3	2	1	0	2,67	3	0	0	3,00	6	1	2	0	2,33	2	2,67
9	Computer graphics	12	10	2	0	2,83	4	6	2	2,17	5	7	4	1	2,50	4	2,50
10	Sculpture	4	3	1	0	2,75	4	0	0	3,00	10	3	1	0	2,75	15	2,83
11	Painting	7	4	3	0	2,57	7	0	0	3,00	20	5	2	0	2,71	14	2,76
12	Education	7	4	2	1	2,43	5	2	0	2,71	18	5	1	1	2,57	13	2,57
SUM		135	81	44	10	-	71	56	7	-	118	77	48	10	-	98	-
AVERAGE		-	-	-	-	2,55	-	-	-	2,58	10	-	-	-	2,52	8	2,55

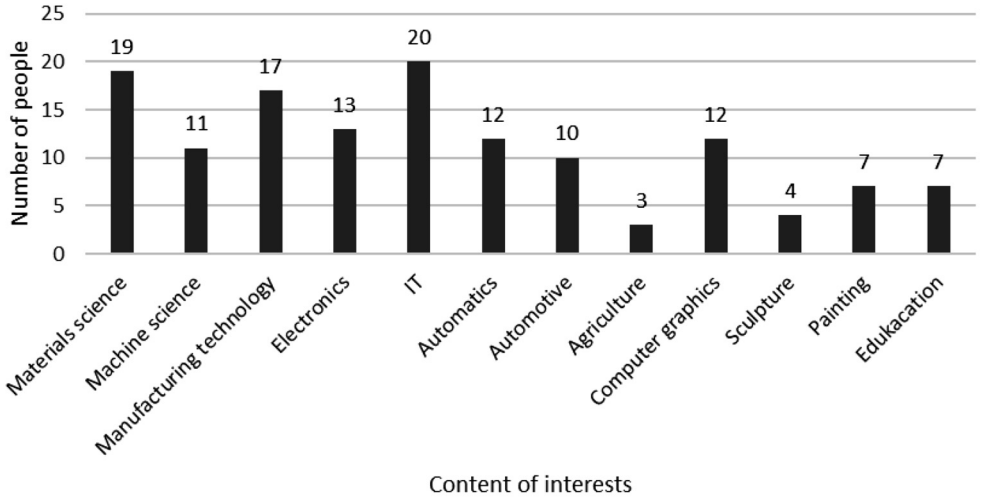

Fig. 2. The content of the interests of the winners of the technical creativity contest during their studies

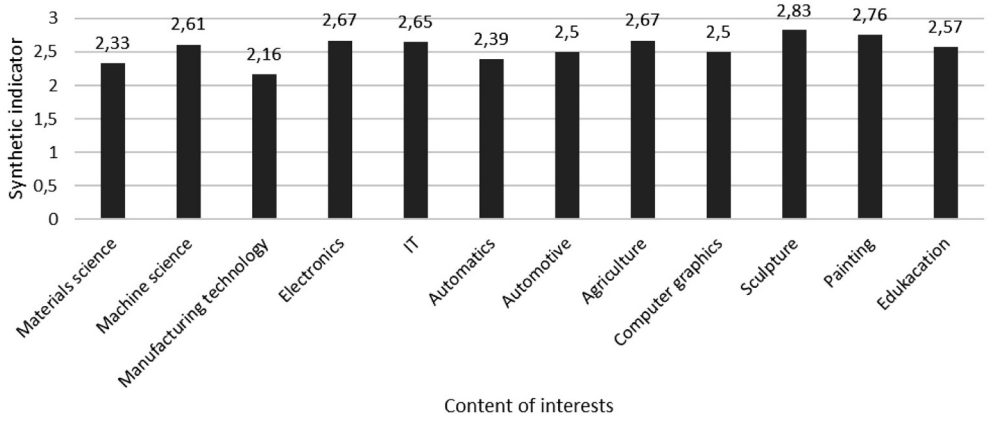

Fig. 3. Synthetic indicator of the development of interests of the winners of the technical creativity contest during their studies

Interests in art are the most developed: sculpture – i_N=2.83 and painting – i_N=2.76. The highest position of these interests is expressed in all indicators: strength, durability and depth. 3 people declare strong interests in sculpture, and one – moderately strong (i_S=2.75), in all of them these interests appeared very early (i_D=3). For 3 people, interests in sculpture are deep, and for one person, they are moderately deep (i_E=2.75). Interest in painting is shown by 7 respondents, for 4 these interests are strong, and for three – moderately strong (i_S=2.57). Interest in painting appeared very early (i_D=3). For 5 people, the interest in painting is deep, and for two – medium-depth (i_E=2.71).

Interests in electronics, agriculture (iN=2.67), computer science (iN=2.65), machine science (iN =2.61), education (iN=2.57) as well as computer graphics and automotive (iN=2.5). Interest in electronics is strong in 10 people, moderately strong – in 1 person, weak – in 2 respondents (iS=2.62). 8 people have been interested in electronics for over 5 years (long-term interests), and 5 people from 1 to 5 years (long-term interests) (iD=2.62). 11 people spend more than 5 hours a week on their interests in electronics (deep interests), the 1st person spends – from 1 to 5 hours a week (medium-deep interests), and the 1st person – up to 1 hour a week (shallow interests) (iE=2.77). Strong interests in agriculture are found in 2 respondents, and moderately strong in (iS=2.67). Interest in agriculture is characterized by high durability – (iD=3.00). In one person, the interest in agriculture is deep, in two people it is of medium depth (iE=2.33). Out of 20 people declaring an interest in computer science, 15 have strong interests, and 5 have medium-strong interests (iS=2.75). 14 interests in computer science are long-term, and 6 – permanent (iD=2.70). The criterion of deep interests was met by 11 interests in computer science, medium-depth interests by 8 and shallow interests by 1 (iE=2.50). In the group of 11 interests in mechanical science, 6 are strong, 4 – moderately strong, 1 – weak (iS=2.45). 8 interests in mechanical science are long-term, 1 – permanent, and 2 short-term (iD=2.55). 9 interests in mechanical science are deep, 2 – medium-depth (iE=2.82). In the field of education, out of 7 interests, 4 are strong, 2 – moderately strong, 1 – weak (iS=2.43). In 5 people, interest in education is long-term, and in 2 – permanent (iD=2.71). 5 interests in education are deep, 1 – medium and 1 shallow (iE=2.57). 10 interests in computer graphics out of 12 reported are at the strong level, and 2 of them – medium-strong (iS=2.83). 4 interests in computer graphics are long-term, 6 – permanent, and 2 – short-term (iD=2.17). 7 interests in computer graphics are deep, 4 – medium deep and 1 – shallow (iD=2.50). Among the 10 interests in the automotive industry, 5 meet the criterion of strong interests and 5 – medium-strong interests (iS=2.50). 7 interests in the automotive industry is long-term, 3 – permanent (iD=2.70). 4 interests in motorization are deep, 5 – medium deep and 1 – shallow (iE=2.30).

The lowest level of development among the twelve interests declared by the respondents is characteristic of three interests: automation (iN=2.39), materials science (iN=2.33) and technology (iN=2.16). From the 12-person group of interests in automation, 6 are strong and 6 – medium (iS=2.50), 3 – long-term, 9 – permanent (iD=2.25), 5 deep and 7 medium (iE=2.42). Among the 19 interests in materials science, 9 are strong, 7 – moderately strong, 3 – weak (iS=2.32), 5 – long-term, 13 – permanent and 1 – short-term (iD=2.21), 9 – deep and 10 – medium (iE=2.47). The structure of the 17 interests in technology is as follows: 7 are strong, 7 – moderately strong, 3 – weak (iS=2.24), 4 – long-term, 11 – permanent and 2 – short-term (iD=2.12), 7 – deep, 5 – medium deep and 5 – shallow (iE=2.12).

Completion of studies and taking up professional work causes a change in the content and individual characteristics of interests. The declaration of interests of

working people – winners of the technical creativity contest, along with interest indicators are presented in the summary table 2.

Table 2. Interests of students during their professional work – summary table (marking: strength: 3 – strong interests, 2 – moderately strong interests, 1 – weak interests, iS – strength indicator; durability: 3 – long-term, 2 – permanent, 3 – short-term, iD – durability index, L – time of displaying interests, depth: 3 – deep interests, 2 – medium-depth interests, 1 – shallow interests, iE – depth index, h – number of hours devoted to the development of interests in a week, iN – index synthetic)

No.	Content of interest	Number of people	Strenght				Durability					Depth					iN
			3	2	1	iS	3	2	1	iD	L year	3	2	1	iE	H hour	
1	Materials science	14	5	1	8	1,79	9	1	4	2,36	8	7	5	2	2,36	5	2,17
2	Machine science	17	8	7	2	2,35	8	7	2	2,35	5	11	5	1	2,59	8	2,43
3	Manufacturing technology	16	4	11	1	2,19	11	5	0	2,69	6	14	2	0	2,88	30	2,58
4	Electronics	13	7	6	0	2,54	12	1	0	2,92	11	10	3	0	2,77	8	2,74
5	IT	5	2	3	0	2,40	3	2	0	2,60	25	4	1	0	2,80	20	2,60
6	Automatics	9	2	1	6	1,56	4	5	0	2,44	4	7	2	0	2,78	10	2,26
7	Automotive	11	8	1	2	2,55	6	5	0	2,55	6	8	3	0	2,73	5	2,61
8	Agriculture	5	4	1	0	2,80	3	2	0	2,60	7	5	0	0	3,00	17	2,80
9	Computer graphics	19	7	8	4	2,16	11	5	3	2,42	15	14	4	1	2,68	13	2,42
10	Sculpture	0	0	0	0	0,00	0	0	0	0,00	0	0	0	0	0,00	0	0,00
11	Painting	6	2	1	3	1,83	6	0	0	3,00	25	5	1	0	2,83	15	2,56
12	Education	21	14	6	0	2,70	7	13	0	2,35	9	17	3	0	2,85	18	2,63
SUM		135	63	46	26	-	80	46	9	-	120	102	29	4	-	149	-
AVERAGE		-	-	-	-	2,26	-	-	-	2,57	11	-	-	-	2,75	14	2,53

Most working people (tab. 2, fig. 4) are interested in education (20 people, which is 44% of the respondents), followed by: computer graphics (19 people – 42%), mechanical engineering (17 respondents – 38%), technology (16 people – 36%), materials science (14 people – 31%), electronics (13 people – 29%). A large group of respondents are interested in the automotive industry (11 respondents – 24%) and automation (9 respondents – 20%). Among the surveyed laureates, interest in painting (6 people – 13%), agriculture and computer science (5 people each – 11%) is the least represented among the surveyed laureates.

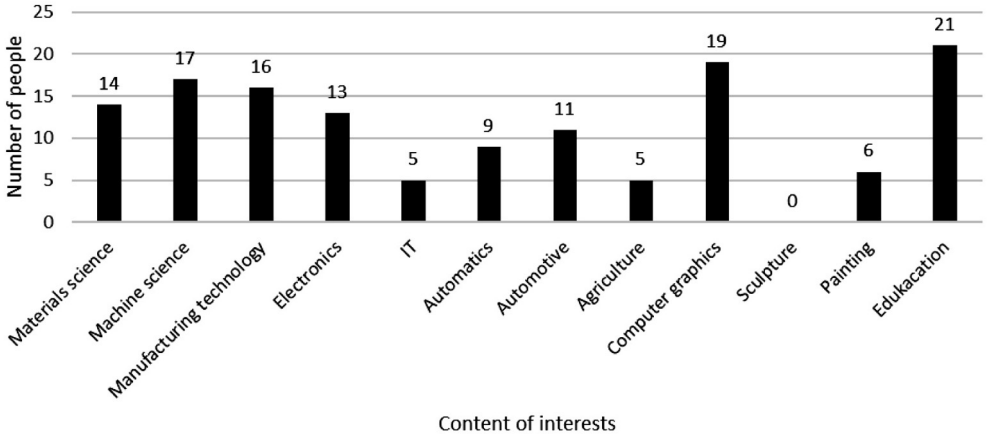

Fig. 4. The content of the interests of the winners of the technical creativity contest after taking up professional work

The interests of working people – regardless of the content – are characterized by a high degree of development (tab. 2, fig. 5) – the average synthetic coefficient w_N is 2.53, which for individual interests ranges from 2.17 to 2.80.

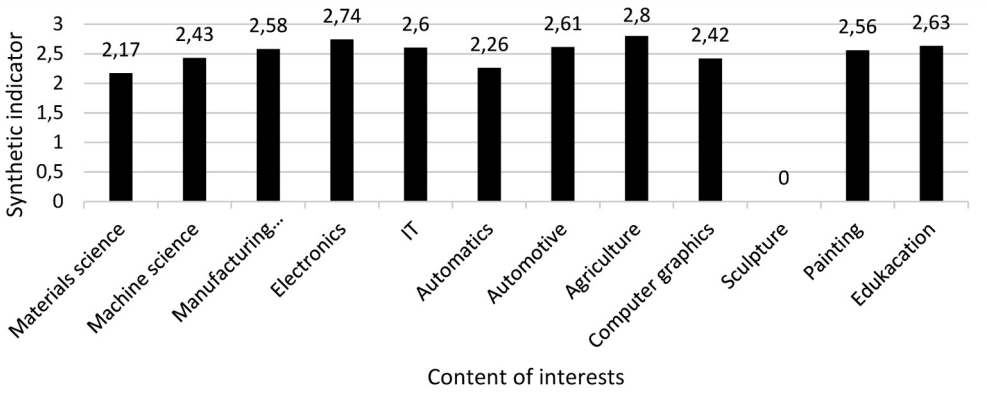

Fig. 5. Synthetic indicator of the development of interests of the winners of the technical creation contest during their professional work

The highest rate of development was recorded by interest in agriculture – i_N=2.80. Of the 5 interests in agriculture, 4 are strong and 1 – moderately strong (i_S=2.80), 3 – long-term, 2 – permanent (i_D=2.60), all are deep interests (i_E=3.00). The interest in electronics has the second highest indicator of development – i_N=2.74. Of the 13 interests in electronics reported by respondents, 7 of them are strong, 6 – medium (i_S=2.54), 12 – long-term, 1 – permanent (i_D=2.92), 10 – deep and 3 – medium (i_E=2 .74).

Interest in education (i_N=2.63), automotive (i_N=2.61), computer science (i_N=2.60), technology (i_N=2.58) and painting (i_N=2.56) are characterized by a lower value of the synthetic indicator). Among the 21 interests in electronics, there are 14 strong interests, 6 – medium strong (i_S=2.63), 7 – long-term and 13 – permanent (i_D=2.35), 17 – deep and 3 – medium deep (i_E=2.85). Interest in the automotive industry is reported by 11 respondents, in this group there are: 8 strong interests, 1 medium-strong interest, 2 weak interests (i_S=2.55), 6 long-term and 5 permanent (i_D=2.55), 6 deep, 8 medium-deep and 3 shallow (i_E=2.73). Out of 5 interests in computer science, 2 are very strong, 3 – medium (i_S=2.40), 3 – long-term and 2 – permanent (i_D=2.60), 4 – deep and 1 – medium (i_E=2 .80). Interest in technology is reported by 16 people, in terms of structure, 4 are strong, 11 – medium, 1 – weak (i_S=2.19), 11 is long-term and 5 – durable (i_D = 2.69), 14 – deep and 2 – medium-depth (i_E=2.85). In the group of 6 interests in painting, there are 2 strong interests, 1 – medium strong and 3 – weak (i_S=1.83), 6 – long-term (i_D=3.00), 5 – deep and 1 – medium deep (i_E=2 .83).

The lowest value of the synthetic coefficient is characterized by interests in mechanical engineering (i_N=2.43), computer graphics (i_N=2.42), automatics (i_N=2.26) and materials science (i_N=2.17). Out of the 17 numerical group of interests in mechanical science, 8 are strong, 7 – moderately strong, 2 – weak (i_S=2.35), 8 – long-term, 7 – permanent and 2 – short-term (i_D=2.35), 11 – deep, 5 – medium deep, 1 – shallow (i_E=2.59). Among the 9 interests in automation, 2 are strong, 1 – medium, 6 – weak (i_S=1.56), 4 – long-term, 5 – permanent (i_D=2.44), 7 – deep and 2 – medium (i_E=2.78). The structure of the 14 interests in materials science is as follows: 5 interests are strong, 1 – moderately strong, 8 – weak (i_S=1.79), 9 – long-term, 1 – permanent and 4 – short-term (i_D=2.36), 7 – deep, 5 – medium deep and 2 – shallow (i_E=2.17).

In order to better illustrate the interests of the winners of the technical creativity contest, I will present, in accordance with the case study procedure (Merriam, 1988: Lewis 2009), the developmental changes in the interests of one winner of the contest.

Respondent X, after graduating from a forestry technical high school, undertook uniform, five-year studies at the University of Rzeszów in the field of technical and IT education. Twice he took part in the contest of technical creativity, winning the first place. During his studies, in the 4th year, he began to work as a designer and contractor of intercom systems. Immediately after graduation he received three individual job offers. During his studies, he was interested in computer science, electronics and aviation. All interests are assessed as strong by the respondent. He became interested in computer science from the age of 18, devoting 11 hours a week to it. He spent 2 hours a week on developing his interest in electronics. The third interest during studies – the interest in the automotive industry was developed for 2 years, for 1 hour a week. The greatest achievement in the field of the subject's interesting activity was the design and construction of: intercoms,

a medical laser, as well as obtaining and performing a well-paid job during and after studies. The respondent highly evaluates the conditions for the development of interests at the university. Taking up professional work by X slightly modified the content of activities and interests. The respondent lists three dominant interests: electronics, 3D design and construction technology. These interests are very powerful. The interest in electronics has been developed for 20 years, for 5 hours a week. The respondent has been spending 5 hours a week on 3D design for 10 years. The interest in the technology of building structures has been developing for 5 years, devoting 10 hours a week to development. The greatest achievements in the development of these interests include: designing and implementing a car wash control system, redesigning line elements for the electroplating plant and building a residential building.

The winners of the technical creativity contest highly evaluate the usefulness and organization of the technical creativity contest. 28 people (62%) participated in the contest once, 10 people (22%) – twice, and 7 people (16%) – three times. For the majority of students 31 (69%) it was the only contest which they participated in. Participation in the contest turned out to be helpful: in believing in one's own strength, feeling self-confident in 27 cases, gaining new experience for 14 people, mobilizing for further work – 9 people and in the recruitment procedure for work – 8 people. The respondents emphasize the good atmosphere of the contest, transparency of the criteria and evaluation of works, as well as efficient organization.

Discussion and summary

The interests of the winners of the technical creativity contest are at a high level of development – according to the terminology proposed by A. Gurycka, these are mature interests, passions (1978, p. 155), or well-developed individual interests (Hidi and Reninnger 2020).

Taking up a professional job is associated with the continuation of the development of interests manifested during studies, and only in a few cases with their extinction and the emergence of new ones in their place. An example of the signaled phenomenon can be a significant development of interest in education, which in the group of students occurs in 7 cases, and as many as 20 working people mention this interest as dominant. Another interesting fact is the extinction of interest in sculpture, which was reported by 4 students, and does not occur at all among working people.

A similar, very high value of the synthetic index of all interests of the winners of the technical creativity contest during their studies (i_N=2.55) and during their professional career (i_N=2.53) proves the unflagging, high cognitive activity of the respondents. Discrepancies in the indicators of strength (i_S=2.55 – students, i_S=2.26 – working) and the depth of vocational interests (i_E=2.53 – students, i_E=2.75 – working) may indicate greater emotional involvement of students in the development of

interests, which slightly decreases when performing professional duties, and thus the need to devote more time to a given topic. 26 respondents (58%), speaking about good conditions for developing interests during professional activity, point to the important role of family duties in devoting time to their implementation.

When analyzing the results of the research in terms of the strength indicator, it can be seen that there is a clear tendency for the respondents (especially during studies) to rate popular (fashionable) interests as: computer graphics (i_S=2.83), computer science (i_S=2.75) electronics (i_S=2.62) and very unpopular, unique interests such as sculpture (i_S=2.75) and agriculture (i_S=2.67).

Performing professional work is associated with a significant decrease in the strength of interests that are very popular during studies, for example: computer graphics (i_S from 2.83 to 2.16), computer science (i_S from 2.75 to 2.40), maintaining or even increasing very unpopular interests, such as agriculture (i_S from 2.67 to 2.80) and a significant increase in the strength of previously "underestimated" interests, such as education (i_S from 2.43 to 2.70).

It is characteristic for all the surveyed people that their interests are closely related to their current job. Another feature found in 41 people (91%) is the specification of interests during professional activity – the respondents call their interests in general terms, referring them most often to the subjects of study (electronics, machine science), while during their professional work they indicate specific areas of activity, activities (installation photovoltaic systems, repair of agricultural machinery).

Interesting data is provided by the comparison of selected results of research on vocational interests of the winners of the technical creativity contest with the results of research on vocational interests of students of various fields of study. The interests of the winners of the technical creativity contest are much stronger (i_S=2.55) than the interests of other students (i_S=2.10) (A. Marszałek, 2016). The depth of vocational interests is also greater, which, measured by the average time devoted to pursuing interests, is 8 hours a week for the winners of the technical creativity contest and 3 hours a week for the remaining students. Durability of vocational interests of the winners of the technical creativity contest, measured by the number of years from the appearance of interest, is 10 years, while the durability of interests of other students is equal to 3 years.

According to the typology proposed by Super (1964; cf. Darley & Hagenah, 1955), the expressed interests were the subject of the research. These interests, coexisting with the interests shown, inventoried and tested, allow the researcher to take into account to a greater extent the characteristics of interests signaled in the literature on the subject, thus giving a wider spectrum of cognition. The conducted research is in line with the postulate of many scientists regarding the advisability of researching interests several times in a lifetime (Rotgans&Schmidt, 2017). The conducted research also made us aware of the validity of Charlotte Buchler's (1938; cf. Gurycka, 1978; Rachalska, 1982) words that "research and learning about

interests has always been one of the most difficult issues...". I hope, however, that the inclusion of the issues of researching vocational interests expressed and defined by the adopted features in the didactics of a university will allow their deeper exploration, awareness of the importance, and then the creation and harmonious use in educational activities and the work process – so far unused – components of personal potential.

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