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ANALYSIS OF CHILDREN'S PROFESSIONAL ORIENTATION AT SENIOR PRIMARY GRADE

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Abstract

The article summarizes fundamental facts of a part of the research project that was focused on pupils' professional orientation and on technical and practical competence of pupils at senior primary grade of the schools within Moravian-Silesian County. The research was executed by means of on-line data collection provided by Methodical and Evaluation Centre o.p.s. in 2008 and 2009. The data analysis of the results of General Interest Structure Test (AIST-R test), which deals with the professional orientation, demonstrated an interesting structure of pupils' professional orientation. The pupils from 6th up to 8th classes were examined. We obtained preferences of the interests structure, the most sought combinations of career selection, aspiration levels of reached education and all that for about 1,600 pupils. This internationally proven test in a computational version was used continually with a newly constructed achievement method for finding out aptitudes linked with technical and practical competence (TTPP - Test of Technical and Practical Competence). The results that foreshadow possibilities of pupils' professional aiming might become a useful tool of their motivation then.

Keywords

Occupational choice, General Interest Structure Test (AIST-R), professional orientation, Test of Technical and Practical Competence (TTPP), Questionnaire of Attitude towards Science and Technology (DVTZ), Moravian-Silesian County

Introduction

For the time being, there is information available on insufficient interest in professions dealing with manual labour, skilled craftsmen's work or on a total departure from the branches that are focused on the technique and technically and practice-oriented professions. According to the media, apprentice schools, secondary technical schools but also schools of tertiary education in technical branches including IT technologies have problems. According to the information from practice, we are aware of the fact that there is a shortage of design engineers, electrical

engineers, mechanical engineers or civil mechanical engineers. Some huge companies even notify of a need of ten thousand of skilled employees in a horizon of the next ten years. From a point of view of the employers neither situation at the labour market improved by the present crisis even if the overhang of the demand above the offer slightly decreased as regards the working positions in technical professions. However, this situation can be preventively secured earlier than the working market variability collapses thanks to satisfying of inadequate ambitions by means of the education which does not correspond to aptitudes of students. Even if such students graduate from the school, they won't be able to assert themselves in corresponding job positions. Ever since beginning of the school attendance, there are many children who are motivated in order that they did very well at school to avoid a job with a share of manual labour. It means that such children are motivated to obtain a job that is rather connected with paperwork or work in the sphere of business. If such student graduates e.g. from a college focused on entrepreneurial activities and gains „Dis." title, it must be a shock from him/her to work at a position of a stock keeper in a supermarket because of a lack of professional possibilities. Noncompliance with student's professional interests and real aptitudes and unsuitable profession routing must be blamed.

Research Questions

We are aware of the fact that within the population there are people with predispositions for various activities. We also have tools available how to find out their aptitudes and preferences. Despite that there are not many eventualities against the influence of actual attractive career trends by which pupils might be influenced regardless of their dispositions and interests. However, we may develop diagnostics, work out more precise predictions, and help to develop potential that they have. And also we may investigate where and what kind of subsequent coherences are, respectively on the base of these researches we may revise information in the media. So, we have appointed several questions then:

- What professional orientations do pupils prefer at the senior primary grade?
- Which kinds of tendencies dominate?
- What ambitions of subsequent education do children have?
- How is the inclination to a life style formed in relation to the increasing age?
- Are the results of AIST-R test comparable with the results of other testing methods?

File

For the research needs, from the aspect of harmonious regional distribution, we have chosen 17 schools, resp. 87 classes in the Moravian Silesian Region in the CR. The schools were located in small villages as well as in large towns (see Table 1). (Industrial specificity of this region must be considered as a limiting factor for all republic generalisations.) Submission of a school was limited by its minimal computer equipment. In total, 1,650 pupils of senior primary grades aged from 12 to 16 years were tested. Children participation in the research was voluntary, and

within school classes. Schools' principal ship was informed on the investigative targets of the research beforehand. The children were not motivated by any rewards.

From the total file, the incomplete data or the data created by a non standard way were excluded consequently. After exclusion of these data, the complete file was created that counts 1,605 pupils. The resulting file contains the boys (n = 787, 6th-8th grade, aged from 12 to 16 years), and the girls (n = 818, 6th-8th grade, aged from 12 to 16 years) (see Table 2). Average age of the pupils in the individual classes between the girls and the boys is stated in Table 3 (Badošek, Kimplová, Mynářová, 2012). Because of the fact that some tested files might be used separately for the statistic purposes, it means without a relationship to the subsequent data, we might meet some small differences within the text as regards a total number of respondents e.g. (n = 1616) or similar.

Geographic Composition of Whole Sample		
Municipality Size	n	%
Number of People less than 10,000 Inhabitants	747	45
Number of People more than 10,000 Inhabitants	903	55

Tab. 1: Location of school

Age	Boys	Girls
12	112	149
13	229	263
14	262	285
15	172	111
16	12	10
Total	787	818
	1605	

Tab. 2: Numbers of children

Number of Pupils (n) and their average age (M) according to gender and school class membership (the sample without non standard data)

	6th class	7th class	8th class
Boys n =	242.00	263.00	282.00
Boys M =	12.59	13.62	14.66

Girls n =	277.00	281.00	260.00
Girls M =	12.49	13.52	14.48

Tab. 3: Average age of the pupils

Methods and Results

General Interest Structure Test (AIST-R, Allgemeiner Interessen-Struktur-Test)

During the executed research (Badošek, Kimplová, Mynářová, 2012), we obtained a lot of data. We analysed the data consequently by the item analysis and compared them with the other data obtained from different researches. By means of the AIST-R Test (Testcentrum – Hogrefe, Praha, 2006), we evaluated both the inclination to a certain type of personality connected with orientation on a life style according to Holland's Theory (1966) (In Mezera, 2006) and also pupils' aspiration in consequent education. Another possibility how to gain useful information was to evaluate the data obtained from this test that have not been investigated yet. It means, for example, to evaluate the data dealing with the amount of intertype triples of the letters expressing pupil's professional orientation.

Holland created a hexagonal model that contains the following scales at its apexes: R, I, A, S, E, C.

R A realistic type of a person who prefers to work with technical objects or machines, who is skilled in crafts and conservative

I A person who likes to observe, learn, investigate, analyse, a person who is fond of accuracy and logics

A A person with artistic aptitude, for who aesthetics is of value, and who likes to work in situations using his/her creativity, and freethinking

S A person of social type, friendly people who are willing to help other people, and enjoy a contact with them

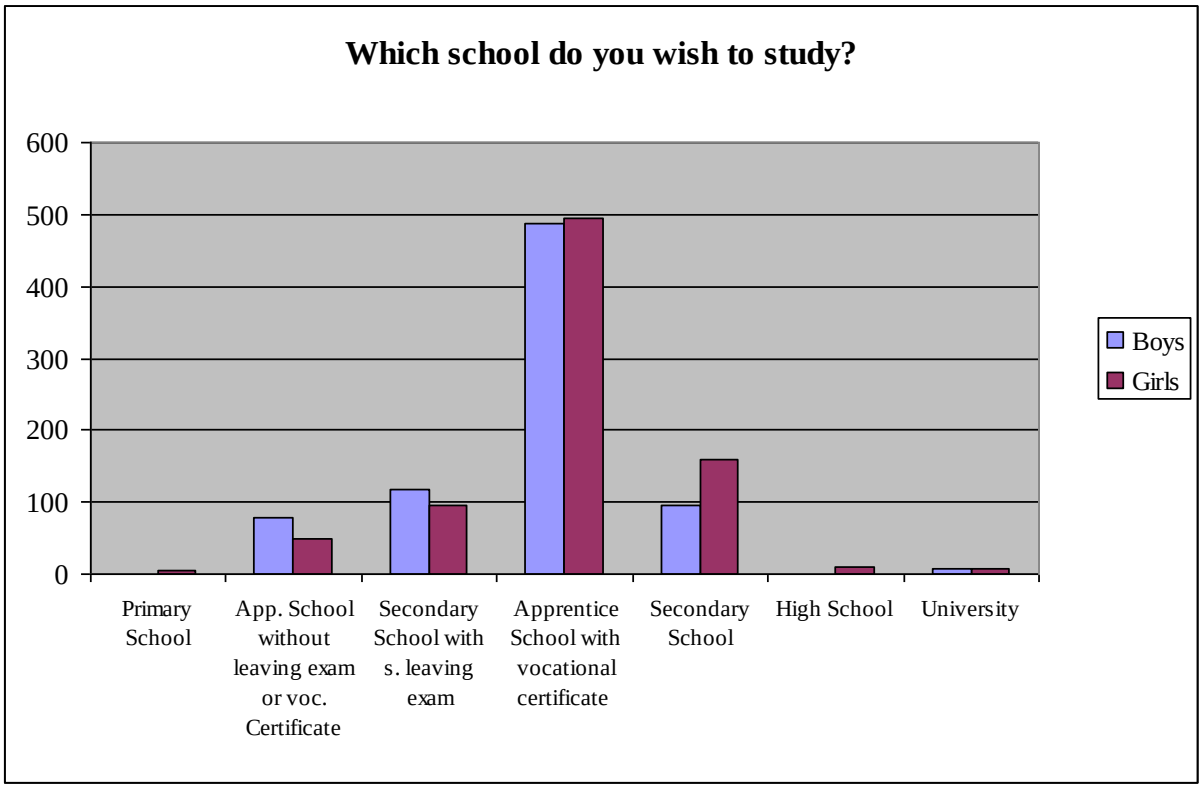
E Persons of this type are enterprising and active. They like to work with people persuading, leading and organizing them. They are focused on success, or economic gains. They are independent with a higher readiness to risk.

C A conventional type of a person. Rules and organised activities are important for them.

If an individual gains the highest score in one from these groups, this is a dominant life style that brings along also a related choice of a profession that complies with him/her. Hlaďo (2009, p. 27) says: „Holland (1966) originally presumed that every individual always belongs to the only from the six types of personality. However, he leaves this presumption in his revised theory and claims that despite of the fact that one type usually dominates, a person does not have to pertain to some from the stated types exclusively but usually he/she is characterised by a certain intertype“. Therefore he selected the first three scales with the higher number of reached points that create a certain code, for example RIA. If a pupil does not have too big difference in a

number of points (according to the table of critical differences) (Boschek, 2006) (In Mezera, 2006) among the individual scales, the code might be extended to 6 positions: for example RIA/RAS or also to 9 positions: RIA/RAS/RAC. In an extreme case the system generates up to four combinations of the codes: SEC/SCE/ESC/CES.

According to Holland, the professional orientation and job selection is in progress in several development periods during the course of which a pupil gradually selects one or more professional groups of jobs. Because of that we might assume that pupils will incline more to one type when they grow up and this type will gradually become dominant. The older pupils are, the shorter codes should be and they should correlate negatively. However, the resulting correlation r = 0.021 (n = 1,605) from our research does not demonstrate that. If we interpret it, the age does not play any role in a more specific differentiation of a certain type of professional orientation. Certainly, even if the examined sample is large, we might not accept these data at their face value because a longitudinal aspect was not considered – only the age variables were taken into account so gradual differentiation of an individual pupil cannot occur. Respectively, a lead ahead in development occurs another time than at the age of the monitored population of the pupils from the 6th to 8th classes. It can be claimed only that the differentiation did not occur within this period. We also expected an effort to shorten the code because of the increasing pressure to select a course of the subsequent education. However, it might be possible that everything is solved in the situation of time pressure. It means in the 9th class that was not included in the testing. Or pupils of this age do not have strong vision yet and, on the contrary, wider interests enable them to solve situation of non specific decisions „which next school to choose".



Graph 1: School ambitions

Further to the previous hypothesis on differentiation, our next investigated object was pupils' aspiration in a type of school for the next education. It is one from the first questions in the AIST-R questionnaire. We were interested in the fact whether representation of the individual types of schools will differentiate according to the gender. We did not determine any expected results for this question. We viewed this as a mapping indicator only. We can see the results in Graph 1.

If we understand the question to the extent that it deals with the closest education not with the absolute level of the education, we can assign grammar schools in a form of an automatic base for university education to the universities and colleges. Then we will get a part of population at the senior primary schools that have ambitions to reach the highest level of the education. This population amounts to 16.2%. Within the statistics, this value is very close to our definition of the above average value. Columns in the middle of the graph demonstrate a fixed pillar of the education at the secondary schools with the school-leaving examination (984 pupils in total from the sample of 1,616). It deals with a more practice-oriented education. If we try to guess differences between the genders, we find out a fundamental difference in the aspiration for grammar schools where the girls have higher representation by 68%. If we compare this piece of information in the context with the data obtained further (e.g. a preference in the code according to a gender that shows a different orientation of the girls and of the boys), we might find out reasons why there is a lack of technically oriented university female students.

The last examined element dealt with a global detection of the most often used type at the position 1 – 6 (it means that only codes with maximally 6 elements were considered – e.g. RIA/RAI) in an unsorted file. However, we monitored also frequency within the sorted file according to the gender that is a quite important gender variable for the professional orientation (Badošek, Biolek, Kimplová, 2009). In that case, due to lucidity, we state the first 3 positions in the code only.

At first sight, the results were striking. Because despite of all the information from the media and practice that deals with a lack of „technicians", R scale has been stated the most often on the first position in the unsorted file. RIA/RAI – is the code that contains a dominance of practical approach and manual work by not isolated testees. The orientation on science, analytical and investigative orientations or artistic orientations that are on the contrary undisciplined and freely creative follow. See the detailed data in Table 4. You can see analogous data in the following code, it means at the positions from 4 up to 6 in Table 5. Again the most preferred scale was R scale followed by A scale at the next position (even if the R scale is de facto presented most, it cannot be repeated in the code). S and E scales are at the last position with a minimal difference. The average pupil's second code in the order should be the following one: RAS or RAE. Again a realistic style leads, respectively with a quite high numerical superiority.

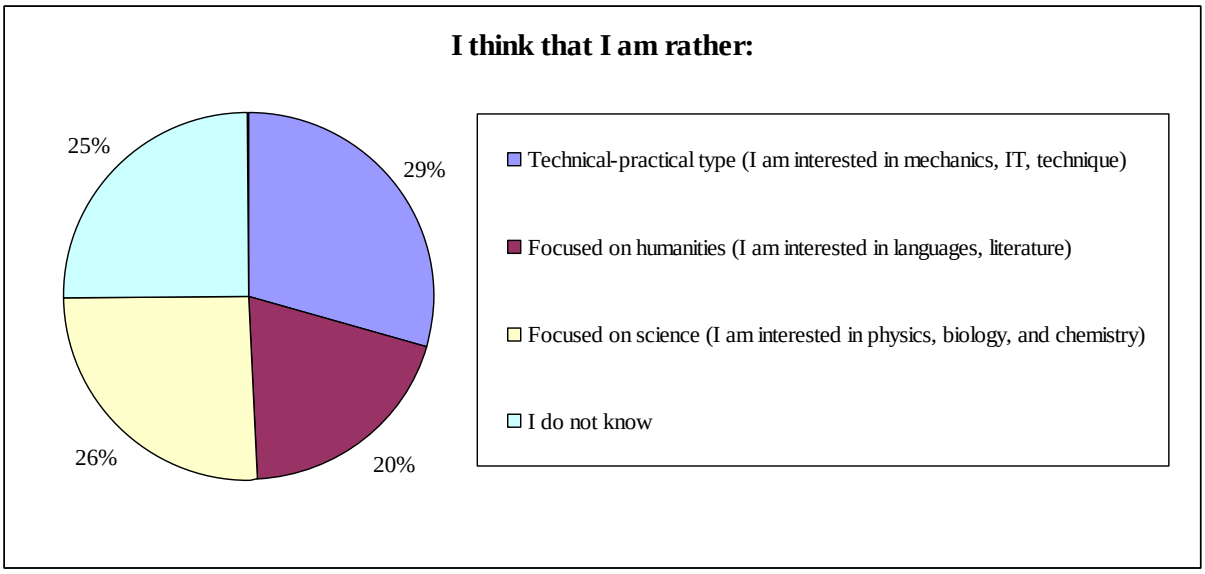
Scale	Frequency at 1st position	Frequency at 2nd position	Frequency at 3rd position
R	**538**	317	295
I	276	**369**	**370**
A	444	**354**	**342**
S	159	220	237
E	119	206	216
C	80	150	156

Tab. 4: Frequency at position 1st–3rd

Scale	Frequency at 4th position	Frequency at 5th position	Frequency at 6th position
R	**572**	461	304
I	208	284	234
A	378	**303**	245
S	176	164	**305**
E	131	191	**291**
C	151	213	237

Tab. 5: Frequency at position 4th–6th

Global results demonstrate that the pupils do not have aversion towards practical activities, they do not mind working outside, respectively with animals or with tools. Where is the problem then? Does AIST-R test generate inadequate results? We are persuaded that not at all. Within a similar research, we have created an original questionnaire that deals with monitoring of scientific and technical interests – DVTZ (DVTZ – Questionnaire of Scientific and Technical Interests). We used this questionnaire to test other 1,050 pupils and students (Badošek, Kimplová, 2010). One of the questions was also the question on self-rating and self-classification to the types: technical-practical, relating to natural science, relating to humanities and also a pending answer of „I do not know" was left in it. The following classification was found out at the primary schools (n = 639) (Graph 2).



Graph 2: Self-classification

On the base of these results, even if it is a partial result, we presume to support the idea that the situation with preferences of the technically oriented professions is not by a long sight so bad and that AIST-R data really correspond to the reality. Enthusiasm to put something in mind is not an important variable. We think that a decisive influence is caused by another factor or factors. Although we might just presuppose even if it was logical that parents' influence might play a role together with inordinate media pressure. So we should give a thought to the fact how effective psychological activity is in reality.

Also classification of the results according to the gender is interesting. It is stated in Table 6 and Table 7. The results in total completely differ from the results according to classification of the individual components. It appears that the girls absolutely uniquely prefer A scale that is dominant for them and that means artistic inclinations, the interest in beauty, aesthetics, and emotional harmonization. However, on the other side, neither R scale is out of mind because it is on the second position. The last position is occupied by I scale. The most typical formula of the girls would be the following: ARI. For the boys the realistic style (R) is in charge on the first position. Investigative style (I) is on the second position and artistic style (A) is on the third position. The most typical formula was RIA. On the base of other experiences, we would expect higher representation of the social scale (S) for the girls but it is not the case.

Boys			
Scale	Frequency at 1st position	Frequency at 2nd position	Frequency at 3rd position
R	**352**	136	104
I	158	**214**	194
A	131	172	**186**

S	57	103	117
E	66	97	107
C	30	72	86

Tab. 6: Frequency at position 1st -3rd boys

Girls			
Scale:	Frequency at 1st position	Frequency at 2nd position	Frequency at 3rd position
R	186	**181**	191
I	118	155	**176**
A	**313**	182	156
S	102	117	120
E	53	109	109
C	50	78	70

Tab. 7: Frequency at position 1st -3rd girls

It seams that the girls want less socially oriented preferences than they should have received on the base of a currently used point of view in the community (simply there is less of the girls who want to be e.g. a nurse). We do not know whether it is a standard and permanent phenomenon or whether it is a proof of borders balancing but if we have an opportunity we would like to find it out in our next research.

Test of Technical-Practical Competence (TTPP):

This test was constructed as a screening method for evaluation of technical-practical aptitudes. It deals with a newly created test investigating technical-practical competence. It consists of 30 pictorial tasks that require comprehension of basic mechanical and physical relations. The experimentees choose one correct answer from a few possibilities. It comes from a concept of several tests that were constructed in the past (Miglierini, 1991). It contains simple physical and practical tasks from different areas (friction, pressure, stability, rolling resistance, lever, or similar). (Kimpl, Badošek, Kimplová, 2009) (In Badošek, Biolek, Kimplová, 2009).

Test reliability was verified on pupils (n = 67) within a pilot research. The research was executed by a system of test-retest within the interval of 10 months. The test demonstrates reliability r = 0.76. We might assume that the reliability meets requirements put on the stability in time. Content validity is adequate considering achievement character of the test and its pedagogical orientation (the test contains modified tasks from discussed content of the curriculum that pupils must correctly apply; it is not enough just to remember it).

We expected that the pupils who are interested in technically or practically oriented professions, what was found out according to the AIST-R test, will reach higher score also in this achievement test in accordance with the consideration: a person who is interested in a technical profession must be successful in it and has to understand it. The results were not so noticeable; however, they exist in statistic level even if a practical applicability of the correlations, which are stated further, is insignificant, see Table 8. Even though, we found out some significant correlations. It is valid that for n = 1,605; r crit. = 0.0643; $p<0.01$.

	TTTP
R	0.13
I	0.14
A	-0.06
S	-0.11
E	0.002
C	-0.02

Tab. 8: Correlation TTPP

BTZS	Spatial Imagination	Visual Perception	Arithmetics	Verbal Aptitudes
TTPP	0.40	0.32	0.29	0.32

Tab. 9: Correlation BTZS and TTPP

On the other side, it makes sense that children who reach good achievements in the TTPP test correlate positively with R and I scales (Realistic, Investigative) and negatively with S scale (Social).

Higher correlations were demonstrated if compared with parts of a Czech version of the BTZS test (Test Battery of Basic Aptitude) – originally GATB Test (General Aptitude Test Battery) (Vašina, Komárková, 1975). The achievement within this test correlates with spatial imagination ($r = 0.4$; $p<0.01$) the most and further with verbal ($r = 0.32$; $p<0.01$) and mathematical ($r = 0.29$; $p<0.01$) aptitudes. See detailed results above in Table 9. To a great extent, the success in TTPP test is saturated by intellectual aptitudes. However, according to our experience, it was often demonstrated that the pupils who reached good achievement in the TTPP test (and by that also a link with higher intelligence) and who should have inclined to technical branches were not interested in this area. This finding corresponds to Holland's opinion (1966) (In Mezera, 2006) that interests are more important for the motivation to a certain profession than the intelligence.

Conclusion

Because of a specific region that is well-known by its industrial production, even if a number of respondents was quite high, we mustn't consider the results too seriously and we cannot apply them for the whole Czech Republic. Despite of that, the results indicate preferences of technical and practical professions in both the questionnaires, it means within the AIST-R test and within the DVTZ test. This fact is contrary to the declared lack of interest in technical professions.

There is a modest coherence between the interest in practical activities and achievement in technical tasks. The same as there is a coherence between the aptitude to solve technical-practical tasks and individual elements of the intelligence. Unfortunately, all the links are admittedly valid from a point of view of the statistics but from the aspect of practical utilization, it deals with solitary elements that have an influence in the complex evaluation of the following triple only:

1. Specific aptitudes;
2. Interest;
3. Intelligence.

Deduction on the base of one of them only won't lead to good results.

With regard to school ambitions, from the aspect of Gaussian distribution of aptitudes within the population, we consider a ratio of children who incline to the highest education adequate.

Already AIST-R standards themselves indicate that the girls prefer artistic direction more than the boys within this questionnaire. It does not mean that the girls do not have enough aptitudes for the technical or scientifically oriented professions (if compared by Badošek, Kimplová, Mynářová, 2012) but they are interested in the given professional orientation less or even not at all.

According to us, there are several contradictions: between the aptitudes and the interests, between the interests declared in the tests and pupil's presence at corresponding fields of study or apprenticeship and between that what children want and that what they will do finally. There are many variables: media, wider neighbourhood, family, parents, often friends, fashionable tendencies or sociologic changes in the community.

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