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SECONDARY SCHOOL STUDENTS' INTEREST IN PHYSICS, CHEMISTRY AND MATHEMATICS

Miroslav Dopita

Abstract

Within the project *The research of new creativity competition methods for young people aimed on motivation for research activity in hard sciences, especially mathematics, physics, and chemistry (short title STM-Morava)* funded by the National Research Programme II of the Ministry of Education, Youth and Sports of the Czech Republic, a questionnaire survey was carried out with 500 respondents at the end of 2006 and a check research survey with 540 respondents in 2008. The 2006 survey identified students' interest in physics, chemistry and mathematics. The project co-researchers attempted to raise interest in the said natural sciences among the secondary school students by means of activation methods, projects, competitions, publishing a spare-time natural sciences magazine etc. In the 2008 survey, we try to evaluate the efficiency of the said activities in the secondary school students' interest in natural sciences and their choice of profession and university study majors.

Key words

natural sciences, physics, chemistry, mathematics, interest

In recent years, secondary school students' reasons for choice of university, their interest in a major resulting in university studies are still more and more examined (Mitchell 2005; Lavonen, Byman et al. 2005; Dopita, Grecmanová 2006; Dopita 2007). The objective of this article is to inform of the influence of creativity competitions for young people focused on motivation of scientific research activities in the field of natural sciences, mainly in the field of mathematics, physics and chemistry, by means of arousing situational interest in these sciences in secondary school students. The used method is comparison of data collected before the start and after the end of the project focused on promotion of the said natural sciences corresponding to the school subjects at secondary schools.

At the close of 2006 a questionnaire survey of the sample of 500 respondents of the second grade and in 2008 a repeated research survey of 540 respondents of the last grade. In both the cases the research was carried out in all the districts of the Olomouc region. The research sample is represented by schools with school-leaving examination branches (general upper secondary schools, secondary technical schools and secondary vocational schools with school-leaving examinations) where the project STM-Morava was carried out.

Interest in a school subject

Our research is based on two main approaches influencing students' interest in an object (Krapp 2003). The first one focuses on interest as a personality feature, and the second approach defines interest as a psychic state aroused by specific characteristics of learning environment. The first approach was marked as an object of interest or personal interestedness and the second one is called situational interest. Contrary to personal interestedness, always specific depending on an individual, situational interest is presumed to be spontaneous, fleeting and shared among individuals. Personal interest is a specific issue, enduring in time and may be divided into latent and manifest interest (Schiefele 1991). According to Suzanne Hidi (1990), personal interest develops slowly and inclines to long-term effects upon a person's knowledge and values, while situational interest is an emotional state aroused suddenly by something in one's immediate environment that may have only a short-term effect upon an individual's knowledge and values. Situational interest is produced as a function of the content and context attractiveness and is partly regulated by teachers (Schraw, Flowerday, Lehman 2001).

Mathew Mitchell (1993) as well as Andreas Krapp (2002) distinguish between arousing a situational interest and keeping it. Arousing or activating relate to variables that first stimulate the pupils interested in a specific issue. Keeping an interest relates to variables strengthening the pupils having a clear goal or intention. Mitchell (1993) stated that what is essential for the transition from creating to keeping pupils' situational interest is the learning conditions making the learning contents meaningful and personally relevant for pupils. Krapp (2002) suggested that under certain conditions situational interest may be transformed into personal interest. According to him, this ontogenetic transformation is a two-phase mental process where the central role belongs to internalization and identification. (1) The first impulse for arousing and keeping situational interest. (2) By means of the process of internalization, this situational interest may de-

velop into individual or personal interest, and this is why motivation and interest are not perceived as simple individual variables anymore. From the viewpoint of teaching the physics, chemistry and mathematics, the critical point of situational interest seems to be how to keep it as long as possible, to set it in the direction of study motivation. Mary Ainley, Suzanne Hidi and Dagmar Berndorff (2002) advised interconnecting interest and learning. In this idea, interest is related to an emotional response and may be viewed as an integrated part of a complex network of psychological, social and physical factors in a certain learning situation (Volet and Järvelä, 2001; Lavonen and Byman et al. 2005).

At the close of 2006 a questionnaire survey identified pupils' interest in physics, chemistry and mathematics before the start of the project. Then since the collection of research data in 2006 until June 2008, i.e. 18 months, our colleagues from the Faculty of Science, Palacký University, Olomouc worked with pupils in order to deepen their situational interest in the majors of physics, chemistry and mathematics, mainly by means of:

1. Specific natural-science competitions of the type of school projects modelling conditions of research activities in natural sciences.
2. Competitions of the type of technical (integrated, competent) kangaroo including questions and creative tasks in mathematics, physics and chemistry, science and technology as well as foreign languages.
3. New types of interactive competitions of the individual as well as team character in the field of mathematics, physics, chemistry and their combinations using modern communication technologies (Internet, SMS) and including realizations of a final seminars for winners.
4. Short-term competitions realized within popularization of natural sciences, e.g. chemistry, physics and mathematics fairs, summer school of young chemists, physicists and mathematicians, natural-science orienteering competition etc.
5. Mathematic competition "Tournament of Towns" within the region as well as on the international level. In order to verify the new type of mathematic competition for primary and secondary school pupils in the Czech Republic.
6. Mathematic competitions and projects within a class or school (lap competitions of individuals and teams) for the 1st and 2nd levels of primary schools and 8-year gymnasiums allowing participation of handicapped pupils (events of the type of Mathematics Plays).

7. Competitions of a creative character requiring participants' active approach to the input data (Fermi's Problems) or creating a scientific reality (the Inventor competition).
8. Practical verification of new procedures of the solutionist – secondary school student and the tutor – university lecturer within creativity competitions.
9. Students' participation in scientific competitions focused on support of the tertiary education students' interest in further science and research.
10. Realization of a set of innovative chemistry competitive workshops – an innovative form of education and its pedagogical evaluation.

Eighteen months later the research survey was repeated. Our intention was to find out pupils' interest in secondary school subjects at a five-point scale and the outputs were interpreted by means of V-coefficient. In 2006 the subjects of physics, chemistry and mathematics were the least popular ones, gained even slightly negative evaluation in comparison to other subjects taught at secondary schools (see Figure 1).

Figure 1: Relation of pupils to subjects at secondary schools (V-coefficient)
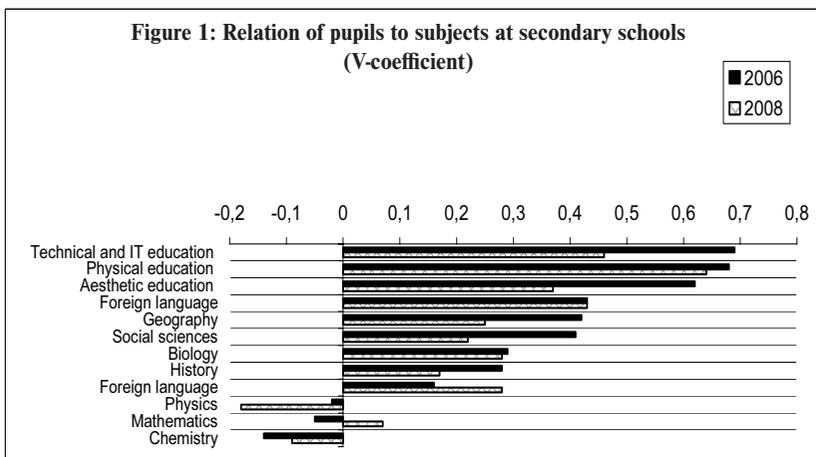
After the project there was a slight shift in the evaluation of the said subjects. The best progress was in mathematics (shift from –0.05 in 2006 to 0.07 in 2008), a minor shift can be noticed also in chemistry (shift from –0.14 in 2006 to –0.09 in 2008), the worst evaluated one was physics (in –0.02 in 2006 to –0.18 in 2008). In the set list of secondary school subjects, there was a slight shift of order among mathematics, chemistry and physics where physics is the worst perceived one.

We also asked the pupils about their most favourite subject at secondary school (see Figure 2). There were more significant shifts. In the subjects examined, there was an increase in mathematics (from 6.2 % in 2006 to 11.2 % in 2008), chemistry (from 5.4 % in 2006 to 9.0 % in 2008) but also a decrease in physics (from 4.0 % in 2006 to 2.7 % in 2008). In 2008 mathematics improved its position of one level, it is in the 4th place. Chemistry keeps its 6th place and the situation of physics worsened of one place in comparison with 2006, it is on the 11th place. The said shifts in the popularity of the subjects correspond with the evaluation of the subjects.

Figure 2: Evaluation of popularity of subjects at secondary schools (Percentage)
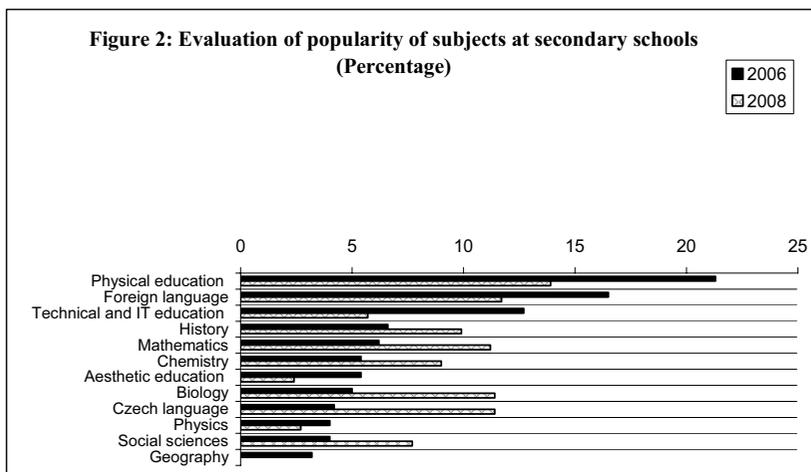
In the choice of the most popular school subject in 2008, the outcomes of chemistry and mathematics were better than in the evaluation of each subject at the 1–5 scale.

Interest in university studies

According to the OECD statistics, there are still few university graduates in the Czech Republic; nevertheless some universities and faculties have overage of applicants and some others lack them. According to *Education at a Glance 2008: OECD Indicators* (2008, pp. 66-69), 57 % young people in the cohort of 18-19 years of age enter university in the OECD countries; in the Czech Republic it is 50 % population of the said age cohort. There is still a lack of applicants for studying natural science majors (physics, chemistry and mathematics) (Table 1).

Table 1 Structure of university students according to the OECD statistics

Health and welfare	11
Life sciences, physical sciences & agriculture	7
Mathematics and computer science	6
Humanities, arts and education	18
Social sciences, business, law and services	32
Engineering, manufacturing and construction	15
Not known or unspecified	10

Source: *Education at a Glance 2008: OECD Indicators* (2008, p. 70)

What is crucial for the choice of a university? There are several factors intervening in the choice of a university major. The American sociologist Amy Stuart Wells (2002, p. 510) describes the situation in the U.S.A. and in short she gives three groups of factors: (1) "Supply-side" studies of schools responding to the freer market of school choice. (2) "Demand-side" studies of parents or "consumers" responding to choice policies. (3) "Efficiency" studies that attempt to measure the overall improvement of the educational system in general and students achievement more specifically as a result of school choice policies. Diana Tavares, Orlanda Tavares, Elsa Justino and Alberto Amaral (2008) describe the outcomes of a large research carried out in Portugal and give the these factors of influence: availability of jobs, specialization, innovative character of the major, emphasis on theory, emphasis on practice, entrance level, university abilities, quality of university life, entrance exams.

In the sociological literature several approaches to the explanation of the choice of a university can be found. These are approaches emphasizing the influence of the cultural and social capital of the family on choosing a university as represented by Pierre Bourdieu and Jean-Claude Passeron (1964; 1990) or Pierre Bourdieu (1989) in the European context. Other approaches emphasize rational choice where the regulator of the choice of educational career is the market. The choice of a university is not only a product of the market but it is also a part of its development. James S. Coleman and Thomas J. Ferraro (1992, p. xi) state that for rational behaviour a man uses some kind of *optimization* defined sometimes as maximization of profit, sometimes as minimization of costs or in another way; and it is optimization that gives potency to the theory of rational choice. But the theory of rational choice has a number of critics. Rational decision is based on a set of quality information which future students do not have an opportunity to obtain. How to evaluate the quality of a study

programme, outcomes of a research? They can use only symbolical indicators as the name and reputation of a university. David D. Dill (1997) writes of immature consumers in this context.

Table 2 At university I would like to study

	2006	2008
Social sciences (economics, philosophy, history, management, political studies, psychology, social work, sociology, ...)	44.0	45.0
Informatics	38.6	**21.7**
Technics (engineering, civil engineering, architecture, electrotechnics...)	36.9	**25.0**
Natural sciences (biology, physics, chemistry, mathematics, geography, ...	34.1	**40.2**
Foreign languages (translation, interpreting, ...)	32.7	27.0
Law and administration	25.3	23.7
Artistic majors (acting, direction, fine art, music, design, media studies, ...)	24.9	20.2
Medicine, pharmacy	24.1	23.7
Teaching of social sciences, languages, ...	14.3	13.1
Leisure and outdoor education, training	14.1	13.0
Teaching of natural sciences	10.0	9.8
Agriculture, farming, forestry	5.8	5.6
Theology – religion	2.8	2.6

This is why we asked secondary school students in our research what majors they would like to study at university, and compared their responses to the ones obtained in 2006 (Table 2). In 2006 87.3 % secondary school students were thinking about university studies and 0.6 % of them did not know whether they wanted to study. The 2008 outcomes show that 83.7 % secondary school students think about studying at university and 10.2 % answers was "I do not know". This is why the secondary school students were asked what majors wanted to study at university, and their responses were compared to the answers from 2006. There was an interesting shift in the majors which secondary school students would have liked to study in the future. A significant increase can be observed in the interest in studying natural sciences what corresponded with the fulfilment of the objectives of the project within which the research was carried out. Contrary to this, a considerable decrease of interest can be noted in informatics and technical majors (see Table 2).

Table 3 Preference of universities

2006		What university would you like to study?	2008	
n	%		n	%
327	65.1	Palacký University, Olomouc	303	56.1
314	62.5	Masaryk University	289	53.5
269	53.6	Charles University in Prague	232	43.0
181	36.1	Brno University of Technology	132	24.4
173	34.5	Czech Technical University in Prague	111	20.6
173	34.5	University of Ostrava	84	**15.6**
163	32.5	University of Defence	82	**15.2**
136	27.1	VŠB – Technical University of Ostrava	66	**12.2**
136	27.1	University of Economics, Prague	100	18.5
135	26.9	Tomas Bata University in Zlín	87	16.1
133	26.5	University of Hradec Králové	87	16.1
127	25.3	University of Pardubice	42	7.8
122	24.3	Technical University of Liberec	48	8.9
116	23.1	University of Veterinary and Pharmaceutical Sciences Brno	79	14.6
108	21.5	Silesian University in Opava	32	5.9
103	20.5	The Institute of Chemical Technology, Prague	58	10.7
87	17.3	University of South Bohemia in České Budějovice	18	3.3
75	14.9	University of Jan Evangelista Purkyně	13	2.4
75	14.5	University of West Bohemia	20	3.7
59	11.8	Mendel University of Agriculture and Forestry in Brno	32	5.9
37	7.4	Czech University of Agriculture Prague	11	2.0

The following question was what university would be chosen by secondary school students. In the responses collected in 2006 most respondents would have chosen Palacký University, Olomouc (65.1 %), others chose Masaryk University in Brno (62.5 %) followed by the students interested in Charles University in Prague (53.6 %). Other universities were chosen by less than 40 % respondents. The smallest number of potential applicants belonged to Mendel University of Agriculture and Forestry in Brno (11.8 %) and the Czech University of Agriculture Prague (7.4 %) (Table 3).

In 2008 when the research was repeated the first five places among universities were confirmed. University of Economics, Prague shifted to the sixth

place, followed by Tomas Bata University in Zlín (7) and University of Hradec Kralove (8). University of Ostrava (9) and University of Defence (10) shifted behind them from upper places. The eleventh place belongs to the University of Veterinary and Pharmaceutical Sciences Brno and the next one to VŠB – Technical University of Ostrava (12). The thirteenth place came to the The Institute of Chemical Technology, Prague – 10.7 %. Other universities gained less than 10 % votes.

Table 4 Factors of influence on choice of a university

In case you are successful in enrolment at several universities your choice will be influenced by:	2006	2008
interest in the major	72.9	74.1
university's connection with the practical life	67.5	67.4
teaching equipment of the university	66.5	63.1
statistics of the graduates' successfulness	66.3	67.2
prestige of the university or the given major	64.1	66.1
expectations of scholarship	58.2	52.0
opportunities of studying abroad	54.2	50.2
probability of accommodation in the university hostel	50.4	45.9
staff's qualification – degrees, publications, researches	47.6	44.3
distance from their home	45.2	42.6
study with their friends	36.5	38.3
the image of the university in the media	24.1	19.4
parent or someone close is its graduate	12.0	9.4

Preferences of universities show the so-called "stone universities" at the first three places. The placement of Palacký University, Olomouc is probably influenced by the location of respondents in the Olomouc region. In 2006 we were interested in specialized studies of natural sciences (biology, physics, chemistry, mathematics, geography). The statistical correlation proved students' significant higher interest in universities as follows: The Institute of Chemical Technology, Prague, University of Pardubice, Palacký University, Olomouc, Charles University in Prague. From the preferred universities it is visible that the respondents apply the criteria of choice of a university as stated above, especially interest in the major, statistics of graduates' assertion and connection with practice and other. The "stone universities" with academic study majors only follow the practice-oriented universities.

What is the situation in the Czech Republic? In a research carried out in the Czech Republic Lenka Menclová and Jarmila Baštová (2005, p. 21) found out that the crucial motivational factors for the students of faculties of science are: career (73.0 %), job (70.0 %), degree (55.0 %), status (40.0 %), distance from the practice (38.3 %), education (33.3 %), interest (23.3 %) and tradition (3.3 %).

What is the opinion of the secondary school students in our research? We asked the students what criterion would have been crucial for them if there were enrolled in several universities. The differences in responses from 2006 and 2008 are not significant (Table 4).

Between 2006 and 2008 there was a slight shift in the secondary school students' responses about the influence of the criteria on their decision but this shift is not significant. The decision on the choice of a university in case the students would have been enrolled at several universities will be influenced according to V-coefficient:

1) very strong influence: interest in the major, then the universities' connection with practice, statistics of the graduates' successfulness, followed by prestige of the university or the given major and teaching equipment of the university.
2) strong influence: expectation of scholarship and opportunities of studying abroad.
3) medial influence: probability of accommodation in the university hostel, staff's qualification – degrees, publications, researches and distance from their home.
4) weak influence: studying with their friends.
5) very weak influence: the image of the university in the media and the fact that a parent or someone close is its graduate.

Conclusion

How to arouse secondary school students' interest in natural sciences? There are several options. One is represented by the project STM-Morava focusing on improving the promotion of natural sciences by means of new methods among secondary school students. This project enabled us to gain the information presented. The project co-researchers see the way especially in the offer of attractive competitions and spare-time activities by means of application of natural science findings in everyday life what may lead to the increase of primary and secondary school students' interest in natural sciences.

We managed to improve the relation to the natural science subjects at secondary schools, namely to mathematics and chemistry; we were less successful in the case of physics. Between 2006 and 2008 mathematics improved its posi-

tion from the fifth to fourth most popular subject at secondary school, chemistry kept its sixth to seventh place and physics can be found at the eleventh place among all the subjects in comparison to 2006. The question is why there was a decrease of the popularity of physics. According to the OECD statistics, 57 % population between 18 to 19 years of age studies in the OECD countries; 50 % in the Czech Republic. Among our respondents 83.7 % is interested in studying at university. In the question of the choice of a future job there was a shift of secondary school students' interest in working with information technologies, namely of 10.4 %. There were more shifts in the choice of a university between 2006 and 2008. An increase was noticed in the interest in specialized study of natural sciences, namely of 6.1 %, on the contrary there was a decrease of 16.9 % in the interest in studying informatics, a decrease of 11.9 % in the interest in studying technics and a decrease of 5.7 % in the interest in studying forewing languages. There is still a question whether we will really meet the students at university who declared their interest in studying natural sciences at university. It will depend on whether situational interest will change into personal interest and at least two fifths of respondents will keep their motivation for studying natural sciences. In the preference of a particular university the first places were kept by the traditional universities. The first place belongs to Palacký University, Olomouc what was definitely influenced also by the realization of research survey in the Olomouc region. The question what will have been crucial for the choice in case the secondary school students were enrolled at several universities was answered with nearly the same responses in both 2006 and 2008. The crucial factor will be mainly interest in the major, further the university's connection with the practice, the statistics of the graduates' successfulness, prestige of the university or the given study major and teaching equipment of the university. The data collected will be analysed in more detail.

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Miroslav Dopita
Department of Education,
Faculty of Education of Palacký University, Olomouc,
Žižkovo nám. 5, 771 40 Olomouc,
miroslav.dopita@upol.cz

HIGH SCHOOL STUDENTS RELATION TO INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE CONTEXT OF BIOLOGY

Milan Kubiatko, Zuzana Haláková

Abstract

The impact of information and communication technologies and computers on our daily lives has been steadily increasing. This fact influences the change of attitudes toward information and communication technologies. In our contribution we focused on finding the differences between genders according to computer attitudes. A questionnaire with 33 Likert type items was used in our research. The sample consists of 518 students from 9 high schools. Data were evaluated with factor analysis, ANOVA, Pearson's chi-square test, Pearson's product moment and for finding out reliability of questionnaire we used Cronbach's alpha. The results of the questionnaire were divided into five dimensions in the concrete 1. The positive influence of ICT; 2. The negative influence of ICT; 3. Advantages of ICT; 4. ICT used in biology lesson; 5. Disadvantages of ICT. Totally, boys have more positive attitudes than girls.

Key words

attitudes, information and communication technologies, biology, students, questionnaire

Introduction

The recent time is influenced by an intensive usage of information and communication technologies. These technologies extend into everyday life of people; they make easier a lot of things. Their influence is obvious in educational process, for example students can pose questions to teacher through web, but they also use internet to interact with one another.

Biology teaching traditionally takes place in one or more of three different environments; the lecture theatre or classroom, the laboratory and the field ('outdoors'). However, with the advent of multimedia technology attempts are being made to translate features of each of these three learning environments to the biology student's computer desktop (Peat, Fernandez 2000; Spicer, Strat-

ford 2001). Biological educators may see the possibilities and opportunities for opening up whole new and exciting ways of learning and teaching using this new technology. Information and computer technologies could be used as a compensation for real dissection. When students were asked, what is more favorable for them, if real dissection or computer-based dissection, majority of students chooses the second alternative (Downie, Meadows 1995; Samsel, Schmidt, Hall, Wood, Schrotf, Schumacker 1994). As we can see, students are influenced by ICT to a large degree and the successful integration of computers in educational environments depends, to a great extent, on students' attitudes towards them. Among investigators who belong to this research area the term computer attitude is used. It is defined as a person's general evaluation or feeling of favor or antipathy toward computer technologies and specific computer-related activities. Computer attitude evaluation usually encompasses statements that examine users' interaction with computer hardware, computer software, other persons relating to computers, and activities that involve computer use. (Smith, Caputi, Rawstorne 2000). Various computer/ICT scales have been developed on the measuring of attitudes toward ICT (Al-Khaldi, Al-Jabri 1998, Loyd, Gressard 1984).

Many explorations are focused on finding differences in attitudes and using ICT between genders. Dorup (2004) found that in his sample, males had more access to computers at home, and held more favorable attitudes towards the use of computers in their medical studies compared to females. A small proportion of students reported that they would prefer not to use computers in their studies. Males were also significantly more inclined to replace traditional teaching activities with better ICT resources. Kaplan (1994) reported that while female users of office personal computers (PCs) believe computers are fun, men buy the machines. Men, on the other hand, are reportedly more interested in mastering computer commands and they want to own computers with voice recognition and features that extend their senses. Women want to be able to use the machines; men want to command the machines. This difference in attitude about computer technology based on gender has been explained by some individuals as an outcome of the socialization process. Society views computers as highly technical and part of a male domain (Campbell & McCabe, 1984). The current study of Palaigeorgiou et al. (2005) also confirmed that both men and women had similar engagement with computers and held concerns for the future effects of continuous computer use, but women were more anxious about hardware usage, and judged less positively the consequences of computers in personal

and social life. The investigations of attitudes toward using ICT in biology are not too much extended. Haunsel and Hill (1989) found out that pupils using computers had more positive attitude towards biology and natural sciences than pupils who were educated by traditional styles.

The main aim of our study was to find out differences between genders in attitudes toward the use of information and communication technologies in biology. The hypotheses followed from this aim: The attitudes toward use of ICT in biology are more positive in boys than attitudes toward use of ICT in biology in girls.

Methodology

The measurement tool used in our research was the specially constructed scaled questionnaire of Likert type. The questionnaire was anonymous and it was divided into two sections. In the first section there was an introductory text, following demographic variables, namely gender, age and the year of study. The second section consisted of 33 items. The assignment was to express one's own opinion and to use the scale from "I completely agree" to "I completely disagree" with given statements. 17 items were negatively formulated, what was taken into consideration by recoding during the evaluation. The questionnaire was filled in by 518 students of nine Slovak high schools, who were 15 to 19 ($x = 16.97$, SD = 1.00) years old. The sample consisted of 37.84 % of boys and 62.16 % of girls from the 1st to the 4th year of study. The respondents filled the questionnaire during a lesson. At first the questionnaires were sent to teachers, who distributed instruments among students. The time of filling the measurement tool was not longer than 20 minutes.

For the statistical evaluation we used Factor analysis with Varimax rotation, which divided items in questionnaire into the five dimensions, namely: 1. The positive influence of ICT; 2. The negative influence of ICT; 3. Advantages of ICT; 4. ICT used in biology lesson; 5. Disadvantages of ICT. We deleted 5 items which factor score was smaller than 0.3 (Anastasi 1996). Next we calculated Cronbach's alpha ($\alpha = 0.82$), which indicates a high value of the questionnaire's reliability. For finding differences between genders ANOVA test, Pearson's chi-square test (χ^2) and Pearson's product moment were used.

The authors of study affer a complete questionnaire on request of interested persons.

Results

During questionnaire evaluation we found out that there was no item where the respondents unanimously chose strictly "yes" or "no" (the average would be 1.0 or 5.0) (table 1). They were close to these extrems in item No 32 "I have got fear, when I used a computer", where the predominate wos the attitude, that the pupils have no fear to use computer and there were no statistic significant differences between the attitudes of boys and girls. The similar stand was taken on the statement No 10 "I consider the work with internet unimportant for teaching process", where many students didn't agree with the statement and consider using internet during teaching process important (4.49).

The items 22 and 29 belonged to the same dimension (Negative influence of ICT) and the students expressed disagreement with uselessness of owning a PC, with making learning harder (or impossible) by using PC (4.35), and with un-suitability of usage of PC during learning because of space requirement (4.26).

Table 1 Values of Likert's scales

item No.	1	2	3	4	5	6	7	8	9	10	11
	3.74	4.22	3.39	3.49	2.89	3.65	3.78	4.36	3.97	4.49	2.48
item No.	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
	3.24	4.03	3.49	3.49	3.49	3.06	2.23	3.78	3.45	3.96	4.35
item No.	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
	2.83	3.82	3.34	3.58	3.95	2.88	4.26	3.99	3.55	4.69	4.01

By the use of Pearson chi-square test (χ^2) we found out statistically significant difference in results between genders in 14 of 33 questions (table 2).

Table 2 Values of Pearson's chi-square test

| item No.	1	2	3	4	5	6	7	8	9	10	11
χ^2	9.74*	13.34**	5.51	26.78***	8.22	22.04***	8.29	8.78	7.49	3.99	25.71***
item No.	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
χ^2	12.51*	6.14	5.48	12.40*	11.44*	16.97**	7.95	7.31	9.01	7.43	4.28
item No.	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
χ^2	31.22***	11.64*	34.34***	9.01	17.32**	33.25***	7.74	12.10*	8.93	6.68	7.49

* statistically significant difference p < 0.05
** statistically significant difference p < 0.01
*** statistically significant difference p < 0.001

In the first question girls more disagreed with the statement that ICT are important in the biology teaching. Similar finding was in the second question, where girls did not agree with statement that ICT make biology lessons more interesting. Girls have bigger problems with understanding of biology curriculum when is ICT used during teaching. In the next question we were interested in which equipment is better for students, if overhead projector or computer. There is an interesting finding that girls did not know what is better for them. They more often mark the neutral statement in comparison with other possibilities and in comparison with boys. But in the next, in which we can reject null hypotheses, girls had more positive attitudes toward teachers examining with the ICT assistance in comparison with boys. Girls have bigger problems with concentrating during biology lessons, when the camera is used and they have problems with communication with teacher when ICT are used during biology lesson. Girls were not convinced of sufficient using of ICT in biology lessons. In general boys are more satisfied with ICT used in biology lessons than girls (figure 1).

Figure 1

The attitudes of boys and girls to the statement No17
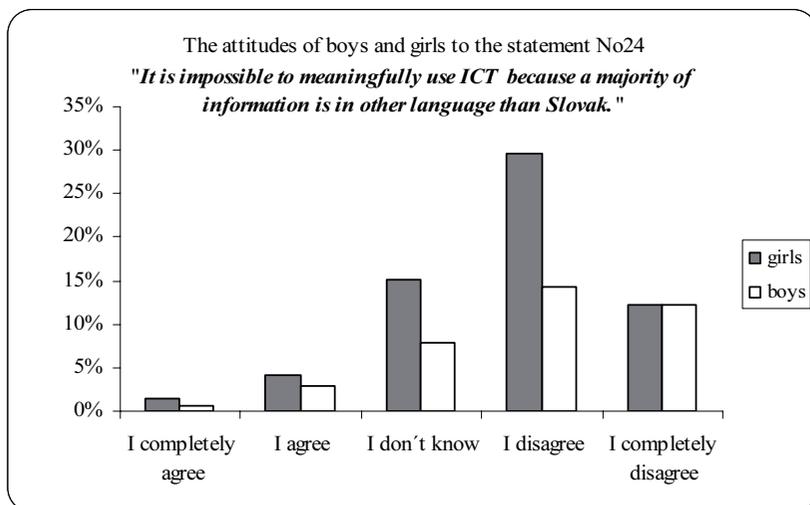*"I am satisfied with ICT used in biology lessons at our school."*
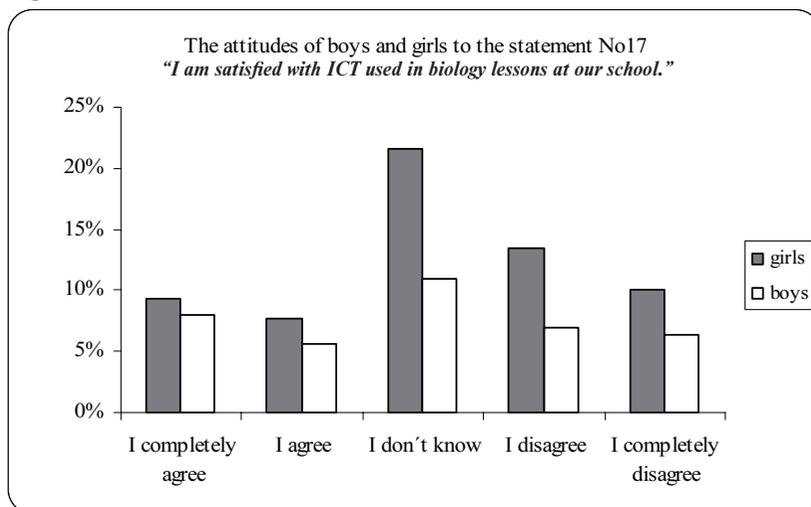
Girls are convinced of negative influence of ICT on eyes. They think that ICT injure eyes, boys are not convinced of this statement. A Similar item, which was connected with injuring of human body by the using of ICT, is concerned

to spine damage. In this statement girls in higher measure marked neutral possibility in comparison with boys. Girls are inclined to believe that ICT could be used in a foreign language as well as in Slovak (figure 2).

Figure 2

The attitudes of boys and girls to the statement No24
"*It is impossible to meaningfully use ICT because a majority of information is in other language than Slovak.*"

Both boys and girls think that their teachers are good in the use if ICT in biology lessons. Teachers need not any training, their abilities are sufficient. In the genders comparison a higher score was achieved by girls in comparison with boys. Girls marked more often the neutral statement in the item "ICT does not save energy" in comparison with boys. And the last question where statistical significant difference was found in results between genders was about ICT and mess. We found out an interesting result that girls perceive ICT and chalk as similar in making a mess. Boys think that computers are less dusty in comparison with using chalk.

We used Pearson correlation (Pearson's product moment) if there is a relationship between dimensions. The values of correlation are shown in table 3. The statistical significant differences between mentioned pupils' attitudes were not found out in comparison of two dimensions called "positive" and "negative" influence of ICT. It is possible to conclude that the items were not defined as ordered pairs which might express the same reality. We focused on different aspects of positive or negative influence of ICT. In comparison of the dimensions

"advantages" and "disadvantages" of ICT a small correlation between the results was found out. This shows the same, that the claims were not duplicated, neither defined in positive nor the same in negative way. Our aim was to think about and to expose different aspects of ICT influence on learning and teaching of high school students. The questionnaires were anonymous and the students expressed their own points of view and attitudes, which were not allowed to be sanctioned. That's why we didn't investigate the students' trustworthiness. The highest value of correlation is between factor 3 (Advantages of ICT) and factor 4 (ICT usage in biology lessons). These two dimensions correlate on the medium level.

Table 3 Values of correlation between dimensions

	factor 2	factor 3	factor 4	factor 5
factor 1	0.01	0.22	0.28	0.21
factor 2		0.11	0.13	0.35
factor 3			0.40	0.30
factor 4				0.31

The most important thing is to find out, if there is a statistical significant difference in the attitudes toward ICT between genders. We found out a statistical significant difference by the use of Analysis of Variance (ANOVA) in the results between genders (F 1, 516) = 4.48; $p < 0.05$). Girls achieved average score 3.61 (n = 322, SD = 0.60) and boys achieved average score 3.68 (n = 196; SD = 0.54). It means that boys have more positive attitudes to ICT in comparison with girls.

Discussion

In our research we tried to investigate differences in gender attitudes toward ICT usage in biology lessons. Our hypothesis followed: The attitudes toward use of ICT in biology are more positive in boys than attitudes toward use of ICT in biology in girls could be accepted. Boys have more positive attitudes toward ICT. This statement is confirmed by the use of statistical procedure. For this finding ANOVA was used. For statistic evaluation we used analysis of variance, factor analysis, Pearson chi-square test (χ^2), and Pearson's correlation and for findings out of reliability we used Cronbach's alpha. We found out five dimensions or categories, namely: 1. The positive influence of ICT; 2. The negative influence of ICT; 3. Advantages of ICT; 4. ICT usage in biology lessons; 5. Disadvantages of ICT. It is a normal thing that public view considers boys and males more technically competent like girls. Cooper has got the similar affirmation

(2006). Cooper (2006) wrote that the general public believes that men and boys are more interested in using computers, and are more competent in the usage of computers. The negative attitudes of girls adversely impact their computer performance. Knowing that girls have negative attitudes towards computers and are reluctant to use them only reinforces the stereotype that computers are for boys and not for girls. Females may have been socialized differently in today's computer generation to become more comfortable with computers hence removing barriers to opportunities for training. This could be due to the increased use of computers for teaching and learning at schools that might have worked against the cultivation of gender differences as reported in previous research (North & Noyes 2002). Computer attitudes and computer skills are related to gender in favor of men, that is, men have better attitudes to computers and more computer skills and experiences than women have (Varank 2007). However, there comes forth a question, how could teachers and educational workers improve students attitudes toward ICT. In our study we present, that in Slovakia are positive attitudes toward ICT, but they could be higher and there are differences between boys and girls. There are some advises: the use of ICT is generally helpful during class suspension, most students preferred a mixed-mode learning environment, i.e. a combination of face-to-face interaction and online activities. Teachers would have to find ways of stimulating a more face-to-face situation without being in the same physical surroundings. One such imperfect solution is the provision of resources such that teachers can do real-time, live, video-broadcasts of their lectures (Bodomo 2003). Teaching and learning of biology could be made more interesting if the lesson presentation using PowerPoint is implemented with other activities to reinforce understanding of the concepts learned. There are many software available which can be provided to the students to allow them to engross the biology concepts, thus making learning more meaningful. The impact of ICT on students' learning outcomes will ultimately depend on the biology teachers. They are the ones who will decide how impart the knowledge the best. The use of ICT will undoubtedly bring new educational experiences for both the learners and the teachers.

So there is an important piece of information that students prefer use of computers. Dorup (2004) found out that between 3 and 7 % of the students (significantly more females than males) who indicated that they would prefer not to have to use computers in their studies.

As an example, roughly 50 % of males versus 25 % of females responded that they would like to replace some traditional teaching with IT-based activities.

In the comparison with this study we found out similar results in our research, our respondents like to use computers and they would like to use ICT more in teaching. So from this results are followed that ICT make the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable among others.

Conclusion

Attitudes results toward ICT using in the biology subject among high school students were based on statistical evaluation – factor analysis, analysis of variance, Pearson's product moment, Pearson's chi-square test, and Cronbach's alpha.

Using factor analysis we found out five dimensions/categories. Using Analysis of Variance we found out some statistical significant differences between boys and girls. Boys perceive ICT in biology more positively than girls and younger students reached higher score in attitudes toward ICT.

Students who were the respondents of our investigation showed an interest in using ICT in the biology lessons, it was obvious from their answers. It is important that ICT can enhance students' learning in science/biology from an early age. But there can be a problem: there is much pressure to use ICT in science/biology lessons but teachers are not always clear about the benefits of ICT.

The major reason why to use ICT in lessons is that it allows teachers to do things better that they can be done without it. The use of ICT should allow the teacher or the pupil to achieve something that could not be achieved without it or allow the teacher to teach or the pupil to learn something more effectively (Taylor, Corrigan 2007).

Successful science lessons that employed ICT were associated with the following pedagogical skills:
– The lesson objectives were clearly identified and tasks were clearly defined.
– The time bonus was used creatively and often involved interventions to encourage discussion and investigate approaches.
– ICT activities were explicitly linked to other activities before, during and after the ICT lessons.
– Teachers planned a greater emphasis on interpretation of results and thinking about science.
– Teachers recognised and built upon the technical skills already acquired by students (Rogers, Finlayson 2003).

Knowing when not to use ICT can be just as important as knowing when and how it should be used.

Acknowledgement

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PaedDr. Milan Kubiatko, PhD.
Educational Research Centre
Faculty of Education
Masaryk University
Poříčí 31
603 00 Brno
Czech republic
mkubiatko@gmail.com

RNDr. Zuzana Haláková, PhD.
Department of Didactics in Sciences,
Psychology and Pedagogy
Faculty of Natural Sciences
Comenius University
Mlynska dolina
842 15 Bratislava
Slovakia
zhalakova@gmail.com

BIOLOGY TEXTBOOKS OF FRAUS PUBLISHING COMPANY AND THEIR TEXT DIFFICULTY

Libuše Hrabí

Abstract

This article presents knowledge of the text difficulty evaluation of biology textbooks of Fraus publishing company . The text analysis was realized by my own methodology. Obtined results show that text difficulty is similar in studied textbooks – from 30.1 points to 34.16 points. It indicate these textbooks into the same scale of difficulty, characteristic for sixth grade of education.

Key words

Biology textbooks, text difficulty, syntactic factor, semantic factor

Abstrakt

V článku jsou obsaženy poznatky o hodnocení obtížnosti výkladového textu v učebnicích přírodopisu od nakladatelství Fraus. Analýza textu byla realizována dle vlastního postupu. Dosažené výsledky ukazují, že obtížnost textu je obnobná v knihách pro 6. až 9. ročník a dosahuje 30,1 bodu až 34,16 bodu. To ukazuje na skutečnost, že všechny knihy spadají do stejného pásma obtížnosti, charakteristického pro 6. ročník.

Klíčová slova

Učebnice přírodopisu, obtížnost textu, syntaktický faktor, sémantický faktor

Introduction

It is possible to mention that textbooks have remained the most important tools in the educational process. There are different publishing companies in the Czech Republic and produce many books and biology textbooks, too. Some of them are used in primary schools, other in further levels of education. A lot of teachers do not know what is the best biology textbook for their education. These ones of Scientia publishing company (1997, 1998, 2000, 2001) or Prodos publishing company (1998, 1999, 2000) are the most required. The quality of textbooks has been studied by experts in different countries (Olechowski 1995,

Ottich – Kowalczyk 1992, Shepardson – Pizzini 1991, Schmidt 1991) and in our country, too (Hrabí, 2003, Pluskal 1996, Průcha, 1984, 1997). The quality of text can be good or bad. But for example biology textbooks of Fraus publishing company have not been studied yet. That is why the aim of this article is to give knowledge of their text difficulty.

Material and methods

The text difficulty was studied in biology textbooks for 6th till 9th grade of FRAUS publishing company (2003, 2005, 2006, 2007). Exact citations are written in the chapter Literature. Fifteen characteristics of text difficulty were examined. Ten samples of text from each biology textbook were selected, and each of them consisted of 100 or more words (ΣN). Particular characteristics, their symbols, definitions, ways of calculation are written as follows:

T – text difficulty; $T = T_s + T_p$ (points),

T_s – syntactic factor; $T_s = 0{,}1 \times \overline{V} \times \overline{U}$ (points),

$\overline{V}$ – average length of sentence (number of words),

$\overline{U}$ – syntactic complexity of sentence,

T_p – semantic factor,

$$T_p = 100 \times \frac{\sum P}{\sum N} \times \frac{\dfrac{\sum P_1}{2} + 2\sum P_2 + \sum P_3 + \sum P_4}{\sum N}$$

$$\overline{V} = \frac{\sum N}{\sum V}$$

$$\overline{U} = \frac{\sum N}{\sum U}$$

ΣN – number of words,

ΣV – number of sentences,
ΣP – number of substantives,
ΣP_1 – number of common terms,
ΣP_2 – number of scientific terms,
ΣP_3 – number of factual terms,
ΣP_4 – number of repeated terms,

$$i = 100 \times \frac{\sum P_2 + \sum P_3}{\sum N}$$ – coefficient of density of scientific and factual information (%),

$$h = 100 \times \frac{\sum P_2 + \sum P_3}{\sum P}$$ – coefficient of density of scientific and factual information (%),

$$o = \frac{\sum P_4}{\sum P} \times 100$$ – koeficient of repeated tinformation (%).

The text difficulty of particular biology textbooks was evaluated according to scale of the biology text difficulty:
sixth grade T = 31 – 34 points
seventh grade T = 33 – 36 points
eigths grade T = 35 – 38 points
ninth grade T = 37 – 40 points

Results

Particular characteristics of the text difficulty are vritten in table 1.

Characteristics of the text difficulty in biology textbook for 6th grade are mentioned. Total number of studied words is 1071 and they form 102 sentences. Average density of one sentence achieves 10.5 words. The syntactic complexity of one sentence is 7.6 words. Total number of substantives is 394 and is formed by four categories – common terms, scientific terms, factual terms and repeated terms. Their numbers are 60, 280, 12 and 42. The value of syntactic factor is 7.98 points and semantic factor achieves 22.12 points. Coefficients of density

of information are 27.26 % and 74.11 %. Coefficient of repeated information reaches 10.66 %.

Total text difficulty achieves 30.1 points and it is possible to mention according to it and the scale of difficulty, that this biology textbook is not difficult for sixth grade of education.

Characteristics of the text difficulty in biology textbook for 7th grade are mentioned. Total number of studied words is 1053 and they form 98 sentences. Average density of one sentence achieves 10.74 words. The syntactic complexity of one sentence is 7.92 words. Total number of substantives is 401 and is formed by four categories – common terms, scientific terms, factual terms and repeated terms. Their numbers are 38, 301, 20 and 42. The value of syntactic factor is 8.51 points and semantic factor achieves 24.76 points. Coefficients of density of information are 30.48 % and 80.05 %. Coefficient of repeated information reaches 10.47 %.

Total text difficulty achieves 33.27 points and it is possible to mention according to it and the scale of difficulty, that this biology textbook is very easy for seventh grade of education.

Characteristics of the text difficulty in biology textbook for 8th grade are mentioned. Total number of studied words is 1120 and they form 110 sentences. Average density of one sentence achieves 10.18 words. The syntactic complexity of one sentence is 7.1 words. Total number of substantives is 321 and is formed by four categories – common terms, scientific terms, factual terms and repeated terms. Their numbers are 81, 321, 16 and 73. The value of syntactic factor is 7.23 points and semantic factor achieves 26.93 points. Coefficients of density of information are 30.09 % and 74.72 %. Coefficient of repeated information reaches 16.19 %.

Total text difficulty achieves 34.16 points and it is possible to mention according to it and the scale of difficulty, that this biology textbook is very easy for eigths grade of education.

Characteristics of the text difficulty in biology textbook for 9th grade are mentioned. Total number of studied words is 1084 and they form 89 sentences. Average density of one sentence achieves 12.18 words. The syntactic complexity of one sentence is 7.58 words. Total number of substantives is 429 and is formed by four categories – common terms, scientific terms, factual terms and repeated terms. Their numbers are 85, 276, 28 and 40. The value of syntactic factor is 9.23 points and semantic factor achieves 24.14 points. Coefficients of density

of information are 28.04 % and 70.86 %. Coefficient of repeated information reaches 9.32 %.

Total text difficulty achieves 33.37 points and it is possible to mention according to it and the scale of difficulty, that this biology textbook is very easy for ninth grade of education.

Table1 Main characteristics of the text difficulty in biology textbooks of FRAUS publishing company

Characteristic	Grade of education			
	6th grade	7th grade	8th grade	9th grade
ΣV	102	98	110	89
ΣN	1071	1053	1120	1084
$\overline{V}$	10.5	10.74	10.18	12.18
$\overline{U}$	7.6	7.92	7.1	7.58
ΣP_1	60	38	81	85
ΣP_2	280	301	321	276
$\Sigma P3$	12	20	16	28
ΣP_4	42	42	73	40
ΣP	394	401	451	429
Ts	7.98	8.51	7.23	9.23
Tp	22.12	24.76	26.93	24.14
T	30.1	33.27	34.16	33.37
i	27.26	30.48	30.09	28.04
h	74.11	80.05	74.72	70.86
o	10.66	10.47	16.19	9.32

Main components of the text difficulty are given in graph 1.

Achieved results demonstrate, that text difficulty increases very slowly from 6th to 8th grade (from 30 to 34 points). The value of text difficulty of biology textbook for ninth grade is similar to this one for 7th grade (33 points). Values of syntactic factor do not differ very much (from 7 to 9 points). Values of semantic factor achieve from 22 to 27 points.

Graph 1 Values of the text difficulty (T), syntactic factor (T_s) and semantic factor (T_p) in biology textbooks of FRAUS publishing company
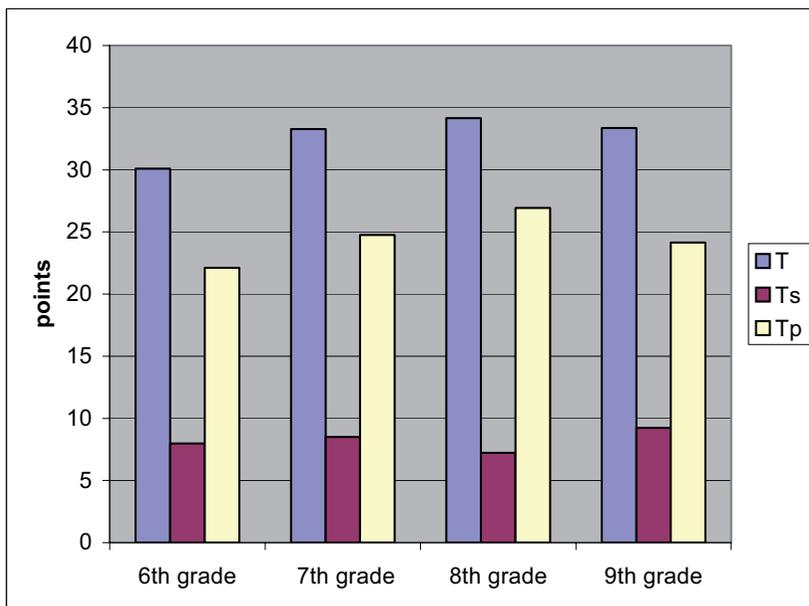
Conclusion

This article contains knowledge about evaluation of the text difficulty of four biology textbooks of Fraus publishing company. Results indicate that text difficulty increasis very slowly from 6th to 8th grade (from 30 to 34 points). The textbook for 9th grade shows lower difficulty level (33 points). According to the scale of difficulty, studied biology textbooks belong to level suitable for 6th grade. The text difficulty of bioly textbooks for 7th till 9th grade should be higher.

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Doc. RNDr. Libuše Hrabí
Department of Biology, Faculty of Education
of Palacký University, Olomouc
Purkrabská 2
771 40 Olomouc

INCLUSIVE EDUCATION IN GREECE AND THE CZECH REPUBLIC
Focus on pupils with hearing loss

Adéla Hanáková

Key words

Integration, inclusion, hearing loss, education, teacher preparatory.

Summary

Students with and without hearing loss can be educated together. They work as a team. Encouraging an understanding of hearing loss is another effective way to break down barriers and uneasiness between students and educators.

An inclusion strategy may include a pre-teach lesson to students with hearing loss so they are prepared for it. "Friday centers" offer opportunities for student collaboration and a review of academic and social skills.

Introduction

In an inclusion model, students receive services within the larger general education classroom. Inclusion partners – a mainstream teacher paired with a teacher specializing in deaf education – share the planning, preparation and execution of lessons. The relationship between the mainstream educator and the teacher of the deaf is one of the most important elements of a successful inclusion program. It is necessary to give answers to questions as: Who will be directly responsible for meeting the designated needs of students with hearing loss and how will the teacher of the deaf and the mainstream teacher communicate and agree upon those needs? (Tracz, 2006.)

1 Hearing impaired children in Greece

People with special needs didn't have a fine educational training. They were thought to be dependent and invalid. The Ministry of Education has a major goal: the school integration of children with special needs. Unfortunately, Law 1566/85, on special education is less clear about inclusive education and much less specific on how inclusive education ought to be implemented. This means

there may be many mistakes trying to make inclusive education reality (Lampropoulou, Padeliadou, 1995).

A minority believes that deaf people should be educated in special classrooms and schools. The majority tries to integrate deaf and non-deaf children in the same classroom. Lampropoulou (2001) describes it as a pressure to include the deaf in the common school program, in which they can have the same opportunities with non-deaf children. A lot of things must be done first, if the Ministry of Education tries to integrate them. Firstly, handicapped children need specialized help (Lampropoulou, 2001).

In Greece inclusive education started in 1981 with students characterised with mild mental retardation who attended some school subjects at elementary and comprehensive level. This effort was motivated by people who catered for kids with special needs. It was not a state's policy (Lampropoulou et al., 1995).

From 1984 to 1989, there was a special classroom expansion. However, special classes function without specialist personnel, without specially selected material and often without special organizational arrangements. Nevertheless, placing children with special needs in that environment has seemed to increase pressures for more integration (Lampropoulou et al, 1995).

They should spend 80 % of their school time in their regular education classroom and merely go to the resource room for special help in reading and maths. What really happens is that the students stay full time in the resource room, because there are no special schools existing and parents are satisfied with this situation (Lampropoulou et al., 1995).

From 1989 to 1993, the state makes integration efforts for children with special needs who live in or near Athens and in some specific areas of Greece. The kids had visual impairments, hearing impairments, learning disabilities and mental retardations (Lampropoulou et al, 1995).

Inclusive education is based on the assumption that teachers can come to grips with students with special needs in their classes. A majority of regular teachers do not feel competent to teach students with special needs in their regular education class (Lampropoulou et al, 1995).

Nowadays, deaf children in Greece attend special classrooms and schools. Furthermore, there are special – boarding schools called "EIK". Inclusion will be the future in the Greek system.

Boarding schools help the deaf develop emotional relationships with others who have the same with them problem. Sometimes they fall in love like all the

teenagers. They get socialized. They also have the opportunity to attend evening classes at their boarding schools.

The boarding school in Volos has been closed and the same might happen in Crete because parent cannot bear the situation living without their deaf children, especially when they are of small age. Another reason is the lack of quality in boarding schools. They choose to send their children to ordinary state schools or to specialized classrooms.

After an educational research it has been found that teachers at boarding schools do not have knowledge, effective methodology and the necessary equipment for their classrooms. Also curriculum for the deaf education does not exist.

2   Hearing impaired children in the Czech Republic

The first alternative for providing special needs education is to include deaf pupils in mainstream classes and, when necessary, provide special needs education in small teaching groups. Only when this is not feasible, the second alternative is considered: the provision of special needs education in a special group, class or school.

The general objective of education of deaf children both in the mainstream and segregated provisions is to give them equal opportunities to successful and efficient education in accordance with their needs and abilities. The main principle is the focus on each pupil's strengths and her/his individual learning and development needs. Education has to promote pupils' initiative and self-confidence.

The systematic integration policy in the Czech Republic has started only after 1989. During this period the development of integration has changed towards broader social acceptance of integration of persons with disability, mainstreaming, and better educational and technological support for pupils with special needs in integrated settings. The main principle of education of pupils with special needs is to create equal opportunities for this target group and minimize the negative impact and consequences of the disability to the pupil's access to appropriate level and quality of education. The main goal of integrative education is to create possibilities for building independent life, for social integration and social participation of a person with special needs.

Integration of pupils into regular schools is a practice at all levels of education. Additional provisions tailored with regard to the pupil's needs support the success of school performance of each integrated deaf pupil.

The group integration (special class/unit) within regular schools is eligible, too. Within the group integration pupils are often educated together with other pupils of the school in some subjects and are involved in all extracurricular school activities.

Although the situation of inclusive education has been improving, there are still some difficult areas to be dealt with. The problems are partly caused by the limited resources for additional support teacher into the mainstream class with these pupils. Traditional thinking patterns of teachers (parents) and their resistance to changes has also influence.

Strategic documents on national level deal with these issues and the Ministry of Education, Youth and Sports grants schools for improving conditions for deaf pupils and for supporting their inclusion.

3   Living with two languages and two cultures

3.1 The Deaf Bilingual

Bilingualism in the Deaf community remains a poorly understood topic despite the fact that most Deaf people are indeed bilingual. The bilingualism present is a form of minority language bilingualism in which the members of the Deaf community acquire and use both the minority language (sign language) and the majority language in its written form and sometimes in its spoken or even signed form.

Sign language bilingualism can, of course, also involve the knowledge and use of two or more different sign languages, but this form of bilingualism is less common in the Deaf community and has been the object of fewer studies. Thus, given the definition of bilingualism presented of above, most Deaf people who sign and who use the majority language in their everyday lives (in its written form, for example) are indeed bilingual.

Deaf bilinguals share many similarities with hearing bilinguals. First, they are very diverse. Depending on their degree of hearing loss, the language(s) used in childhood, their education, their occupation, their social networks, and so on, they have developed competencies in their languages (sign language and the majority language) to varying degrees. This, of course, is no different from hearing bilinguals who are also very diverse in their knowledge and use of their languages. Second, most Deaf bilinguals do not judge themselves to be bilingual. In some countries, some Deaf people may not be aware that sign language is

different from the majority language, and in general many Deaf do not think they are bilingual because they do not fully master all the skills that accompany the majority language (or, at times, the sign language). This is a well-known phenomenon found among many bilinguals, be they hearing or Deaf, who have a tendency to evaluate their language competencies as inadequate.

3.2 The Deaf Bicultural

Two questions can be asked about biculturalism in the Deaf community. First, are Deaf people bicultural, and second, if some are, what is being done to help them come to terms with their bicultural identity? As to the first question, there is little doubt that many Deaf meet the three criteria that we put forward above: they live in two or more cultures (their family, friends, colleagues, etc., are members either of the Deaf community or of the hearing world); they adapt, at least in part, to these cultures; and they blend aspects of these cultures. Of course, such factors as deafness in the family, degree of hearing loss, or type of education may lead some Deaf people to have fewer contacts with the hearing world while others have more (their bicultural dominance can thus differ), but it is nevertheless true that most Deaf people are not only bilingual but also bicultural. (This is also the case for hearing children of Deaf parents and for some hearing people who have developed strong ties with the Deaf community.) Of course, most Deaf people are Deaf-dominant biculturals in that they identify primarily with the Deaf community, but many of them also have ties with the hearing world and interact with it and hence, in a sense, are also members of it.

As for the biculturalism of Deaf people, it is especially important that Deaf children and adolescents given every opportunity to learn about the Deaf and hearing cultures, that they be able to go through the process of choosing the cultures (or the culture) they wish to identify with. It is the task of parents, family members, educators, and members of the cultures involved to make sure this process takes place as early and as smoothly as possible.

Conclusion

Inclusion is like a bird. The body represents the role of the deaf child and its parents. The body is the most important part. The wings are symbols for education. One of the wings stands for ordinary education the other one for special education. Only when both of them are used and kept well balanced the bird can fly high. But the bird also needs the right environment to survive. The

environment can be associated with society. Proper legislation and finance are critically essential to create the ideal circumstances for inclusion to blossom.

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WHY SHOULD PARENTS CATER FOR THE DEVELOPMENT OF EMOTIONAL INTELLIGENCE IN THEIR CHILDREN?

Jolanta Karbowniczek, Dorota Wosińska

Abstract

The autor discusses the definition of emotional intelligence, its importance for the development of children and the learning process and outlines some advises for parents who want to raise emotionally inteligent children.

Key words

emotional inteligence, development, learning

Each of us, parents, wants to have an intelligent child who will be able to get the most of their brains – whether it is to think more creatively, solve problems more efficiently, recall information more quickly or learn new things more easily. In other words, we are all anxious for our children's intelligence to develop quickly and well. Expectant parents are encouraged to read and play music to the fetus in order to stimulate its brain as being intelligent is synonymous with being successful in life. But is it really so? Is intelligence a real predictor of our success in future life? For decades, a lot of emphasis has been put on certain aspects of intelligence such as logical reasoning, math skills, spatial skills, understanding analogies, verbal skills etc. Researchers were puzzled by the fact that while IQ could predict to a significant degree academic performance and, to some degree, professional and personal success, there was something missing in this finding. Some of those with fabulous IQ scores were doing poorly in life; one could say that they were wasting their potential by thinking, behaving and communicating in the way that hindered their chances to succeed. One of the major missing parts in the finding is emotional intelligence.

The notion of emotional intelligence

Emotional intelligence is a topic that has attracted a considerable amount of attention recently and has been promoted both by psychiatrists and as a panacea for all our problems. There are half a million web pages on "emotional intelligence," and everyone wants to claim the "right" definition.

So what exactly is meant by emotional intelligence?

There is not one universal and unified definition of emotional intelligence that could explain and clarify this notion. According to the proponents of the concept of emotional intelligence: John Mayer and Peter Salovey (1998) this type of intelligence refers to: "the capacity to reason about emotions, and of emotions to enhance thinking. It includes the abilities to accurately perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth"[1].

In order to give a more comprehensive picture of the term they further defined four critical areas of the theory. These were:

1) identification of emotions, that is the ability to recognize how you and those around you are feeling;
2) using emotions, which in turn, refers to the ability to generate an emotion, and then reason with this emotion;
3) understanding emotions, connected with one's ability to understand complex emotions, and how emotions transition from one stage to another; and finally
4) managing emotions, concerned with the ability that allows one to manage their emotions[2].

Daniel Goleman (1998), however, introduced the model that sees Emotional Intelligence as: "a wide array of competencies and skills that drive leadership performance". Goleman's model is based on four main factors responsible for creating the IE:

1. "self-awareness — the ability to read one's emotions and recognize their impact while using gut feelings to guide decisions,
2. self-management — involves controlling one's emotions and impulses and adapting to changing circumstances,
3. social awareness — the ability to sense, understand, and react to others' emotions while comprehending social networks,
4. relationship management — the ability to inspire, influence, and develop others while managing conflict[3].

According to Goleman (1998) emotional competences are not innate properties. They refer to learned skills that a person achieves through hard work. Yet,

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[1] Mayer, J. D., Caruso, D. R., & Salovey, P. (1998) Emotional intelligence meets traditional standards for an intelligence. Intelligence, 27, 267–298.

[2] Emotional Intelligence Informational website , Homepage of Emotional Intelligence

[3] Goleman, D. (1998). Working with emotional intelligence. New York: Bantam Books

the author states that individuals are born with a general emotional intelligence that determines their potential for learning those emotional competencies.

In defining the term we should not omit the third acknowledged model of EI suggested by Bar-On (1997) who states that: "emotional intelligence is an array of noncognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures". It is the real-world results that the definition focuses on. As Bar-On holds that "emotionally intelligent people are able to effectively manage personal, social and environmental change by realistically and flexibly coping with the immediate situation and solving problems of an interpersonal nature. To do this, they need to manage emotions effectively and be sufficiently optimistic, positive and self-motivated" (Bar-On, 2007)[4].

What role does an emotional intelligence play in our lives?

All the three definitions presented above, although different in details, stress the significant and positive effects of emotional development on people's lives and success. Emotional development relates to how we recognize, understand and choose how we feel, think or act. It shapes our understanding of ourselves (self) and also our interactions with others (family and friends, groups, communities). It often defines how and what we learn, as well as what we put priority to in our daily lives. Our feelings provide us with internal energy and are involved with almost every decision we make. They also help us gather, organize, prioritize, recall and process information which is essential to both health and happiness.

Additionally, high degree of emotional intelligence can help us deal with dangerous and threatening situations. The better emotional memory and recall a person has, the more likely they will be able to quickly spot a similar danger in the future by processing the many cues they are receiving on an emotional level.

Emotional people react faster to others' needs. These are emotional sensitivity and emotional intelligence that make them take a helpful action. What is traditionally understood as conscience is also very closely related to emotional intelligence. When a child begins life with a higher level of emotional intelligence which is later developed in healthy ways, then their conscience is strong and healthy. With a healthy conscience we can make decisions for ourselves without unnecessary rules or external authority figures.

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[4] http://www.reuvenbaron.org/

Developing a child's emotional intelligence also teaches the child to tolerate and respect others' feelings and individuality as not everyone is the same or feels the same. Children become more understanding that we all are different; that we each have different needs, desires and preferences.

When developed in a healthy manner, our natural emotional intelligence can help raise responsible children. Children's ability to control thoughts and feelings as well as their ability to respond to them is the highest form of personal responsibility.[5]

All in all, as emotions play an important role in our daily lives we should promote and enhance them from a very young age. Young children who are emotionally stable, that is, have their emotions under control seem to:
– have more friends,
– better control their behavior,
– have a positive self-esteem, the development of which "contributes to the physical condition of relaxed alertness which optimizes learning". (M. Berman, 1998),
– be more attentive and open to learning what makes them be good learners,
– be more independent in decision making and experience less peer pressure,
– tolerant and understanding towards others,
– are more empathetic[6].

All these lead to long-term happiness and success in life as children grow older.

How do emotions influence our learning?

'All learning has an emotional base' as Plato said. This means that there is some kind of interplay between our emotions and intellect. Emotions are formed in our brain in the limbic system. This small structure located in the middle of the brain between the lower center or brainstem and the higher center or cortex system plays a very important role in our brain. The limbic system interprets sensory information and sends it to the cortex for processing. If the limbic system interprets the information as positive, it sends a message of purpose and excitement and directs our behavior toward a goal. When this happens, we become motivated to act; thinking and learning are enhanced. When the interpretation is negative, the switch is turned off and thinking and learning

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[5] J. Gottman (1998). The heart of parenting . Raising an emotionally intelligent child. Fireside. Simon and Schuster. NY.

[6] Gottman, J. (1998). The heart of parenting . Raising an emotionally intelligent child. Fireside. Simon and Schuster. NY

are stifled. The more positive the learner's memories and reaction to the event (emotional state), the better the learning will be. Research has shown that the state of happiness has a positive effect on learning, memory and social behavior as the feeling of happiness unblocks brain passages. On the contrary, negative emotional states, such as anger and sadness, are said to have a negative impact on learning and motivation. As M. Berman (1998) points out when a negative emotion (stress) accompanies learning the chances for us to learn minimize. It is simply biologically impossible to learn as our receptivity is disturbed. A human being who is under the stress becomes resistant to anything new.

How can parents bring up a child with a high degree of emotional intelligence?

From the very beginning of infancy, parents can help build emotional abilities in children as they grow and develop physical, verbal and social abilities. Young children have an enormous capacity for learning. The early years provide a valuable opportunity to help children learn about emotions and relationships with others. Caring adults are most important in helping a young child to develop emotionally. Some of the best ways to develop emotional intelligence in young children include modelling and creating awareness of their emotions. Mark Brandenburg[7] suggests "Top Ten Ways to Raise Emotionally Intelligent Kids" which when followed daily can give our kids the best chance possible to be happy, productive and responsible adults.

Top Ten Ways to Raise Emotionally Intelligent Kids

1. Model emotional intelligence yourself. Children are good observers and watch their parents very closely. They see when parents are frustrated and how they respond to frustration, they see whether they are aware of their own feelings and the feelings of others. If you have problems with managing your own emotions your child will mirror your behaviours as well.

2. Don't be afraid to say "no" to your children. All loving parents will do almost everything to satisfy their children's needs. Being aware of this your child will demand a lot. But you can not always say "yes". Sometimes you have to say "no" as saying "no" will give your child an opportunity to deal with disappointment and to learn impulse control. To a certain degree, your job as a parent is to allow your children to be frustrated and to work through it. Children who always get what they want typically are not very happy.

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[7] http://www.naturalfamilyonline.com/5-ap/46-emotional-intelligence.htm

3. Create an emotionally safe and supportive environment. Discuss feelings openly. Avoid shouting, violent words or actions. Encourage children to be emotionally honest through acceptance and unconditional love.

4. Try not to judge your children' behaviour. Parents who use judgment and control create feelings of: fear, resentment, powerlessness, anger, defensiveness, insecurity. That is why you should rather start labelling your and your child's feelings, saying" Looks like you are feeling really frustrated or that looks frustrating. You should also give labels to other people' feelings for instance:" The woman in the TV show is really feeling jealous. Try, however, to avoid name-calling. Instead of saying "What an idiot" say: "He must be angry to say that". When your kids are whiny or crying, you should rather say: "You seem sad," than just asking them to stop. Depriving kids of the feelings they are experiencing will only drive them underground and make them stronger.

5. Start coaching your kids. As your children grow older you can start coaching them to help them to be more responsible. Instead of "Get your hat and gloves," you can ask, "What do you need to be ready for school?" Constantly telling your kids what to do does not help them to develop confidence and responsibility.

6. Always be willing to be part of the problem. Good, caring parents willingly listen to their children's problems rather than lecture. Seeing yourself as having something to do with every problem that appears is very supportive. Most problems in families get bigger when parents respond to them in a way that exacerbates the problem. If your child makes a mistake do not tell him:" You see, I told you. But you never listen to me", but show that you are understanding and emphatic. Remember how crucial it is for you to have a calm, reasoned response. Otherwise, your child may start lying to you.

7. Make your kids involved in household duties at an early age. Research suggests that kids who are involved in household chores from an early age tend to be happier and more successful. Why? From an early age, they are made to feel an important part of the family. Children want to belong and feel like they are valuable.

8. Limit your children's access to mass media mania. Young kids need to play, not spend time in front of a screen. To develop creativity and problem-solving skills, allow your kids time to use free play. Much of the mass media market can teach your kids about consumerism, sarcasm and violence. What your kids

learn from you and from free play with others will provide the seeds for future emotional intelligence.

9. Talk about feelings as a family. State your emotional goals as a family. These might be no yelling, no name-calling, be respectful at all times, etc. Families that talk about their goals are more likely to be aware of them and to achieve them.

10. See your children as wonderful. Never underestimate your child. There is no greater way to create emotional intelligence in your child than to see them as wonderful and capable. One law of the universe is, "What you think about expands." If you see your child and think about them as wonderful, you will get a lot of "wonderful." If you think about your child as a problem, you will get a lot of problems.

As Salvoy (1998) puts it: "I think in the coming decade we will see well conducted research demonstrating that emotional skills and competencies predict positive outcomes at home with one's family, in school, and at work. The real challenge is to show that emotional intelligence matters over-and-above psychological constructs that have been measured for decades like personality and IQ. I believe that emotional intelligence holds this promise." So as the above arguments show having a high IQ is nice, but having a high "EQ" is even better. Thus, it is of vital importance to parents and educators to cater for the type intelligence that seems to play such a crucial role in shaping the child's future and establishing such firm grounds for it.

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Prof. dr hab. Jolanta Karbowniczek
Mgr Dorota Wosińska

COMPUTER SOFTWARE AS A HELP PROVIDER
TO STUDENTS UNSUCCESSFUL IN MATHEMATICS

Bohumil Novák, Michal Novák

Summary

We believe that computers can be used to increase the level of success only among such university students who had acquired necessary mathematical skills, basic computer skills and skills relevant to the respective software, and whose level of English is appropriate. In the contribution we give an example of solving a task common in the basic course of mathematical analysis by means of Maple and outline problems, which occur in this respect.

Key words

Prospective teachers' mathematical training, study failure, help-seeking, computer, Maple

Introduction

The issues of learning success at respective grades and types of school and the search for reasons of school failures, bad school results or learning troubles have been constantly monitored and analysed from many points of view. They have been studied and described in a number of empirical researches – both pedagogical and psychological ones. The discussion has resulted in a number of quantitative outcomes, surveys and graphs of respective study programmes and fields of study and in school annual reports and registers.

In our contribution we are going to give several notes from the field of university training in mathematics. It is a well known fact that mathematics present in university curricula is
– a set of specific subjects, usually theoretical ones, which are the scientific content of study (at faculties of science or mathematics and physics) or
– a set of propedeutically oriented disciplines, which provide necessary content and teach necessary skills at universities of technology or faculties of economics or
– subject base at universities training prospective teachers of mathematics.

Our experience has been acquired both from students of mathematics at faculties of education and from students at universities of technology. These students have – despite a number of differences – a lot in common. They share low incoming level of mathematical competence or the fact that theoretical mathematics plays a minor (if any) role in their professional lives after graduation. They also share the fact that they work with information technologies at various levels and in various forms during their university study – a time of shaping and cultivating their characters.

Some general (theoretical and methodological) starting points

As can be seen e.g. from Skalková (1999), Jaworski (1994) pedagogy has redefined the roles of a teacher and a student. The original role of a teacher as a person who teaches students in direct contact and gives them access to his/her knowledge base has transformed into a role of a facilitator who helps, mediates or facilitates the process of study. This invites students to use other sources of information and makes them be active. As some authors – e.g. Fulier (2005), Majovská (2007) – point out, passive reception of knowledge results in mathematics being viewed in a deformed way – as a set of unnecessary, incomprehensible, irrational recipes or algorithms which are not needed or required by anybody (with the exception of the teacher or examiner). Computers not only eliminate or limit arduous and routine calculations but according to some – e.g. Brdička (2003) – they can act as accelerators emphasising a number of teaching methods. The article by Uhlířová (2006), gives an overview of roles of computer in the teaching process. In our contribution we are going to make use of the role of an electronic teacher (closed teaching environments which lead the student, direct and evaluate their learning process) and the role of experimental environment for formulating and verifying hypotheses (in the sense of cognitive and open teaching environments such as computer software Maple, Derive, Mathematica or Matlab). Computer software can be "taught" to provide help in study and to be infinitely patient when a student is trying to solve mathematical tasks and problems.

The issue of providing help in study when solving tasks and problems in the area of psychology is dealt with in Mareš (2002). The author stresses that help-seeking by a student or a pupil can be interpreted also positively as help-seeking indicates interest in finding a solution and enables prevention of fail-

ures. Help-seeking starts with a stage of perplexity, when a student realises the difficulty of the situation and its complexity and is perplexed as there are no obvious solutions or strategies of solution. The student faces the contradiction between what he knows or is capable of doing and what is asked of him. The author gives several typologies and models of help-seeking:

- according to the level of orientation of the person (student) who is facing the problems: the effort to seek external help or the effort to avoid help-seeking,
- according to the way of communication with the potential help provider: verbal, nonverbal or mixed communication,
- according to the result expectations: help-seeking accompanied by the feelings of low, medium or high probability of success,
- according to the type of help provider: seeking help from a human being (teacher, schoolmate, etc.) or a machine (computer, computer software, multimedia device).

Given results of some foreign researches Mareš concludes that situations when students learn by the means of computer and communicate with teachers or other students in real time encourage help-seeking.

The topic of success at study and its subjective reflection (subjective interpretation) is closely connected to factors of social motivation. The social psychology is aware of the model of Weiner (1985), which is sometimes called attributive theory of success and failure. Weiner suggests that our motivation to reach success is determined by our perception of previous successes and failures. He believes that perception of reasons (casual attribution) can be viewed from the point of view of reason localisation (internal or external), reason stability (permanent or temporary) and reason controllability (the subject controls the reason or not).

An interesting attempt to apply the attributive theory in the area of failure at mathematical exams has been done by Marcinek (2005). The author reduces the factors intervening in casual interpretation into locus and stability and obtained the following 4 typical authentic student responses:

Tab. 1 *Typical authentic student responses according to (Marcinek, 2005).*

		Reason locus (position)	
		External	*Internal*
Reason stability	*Unstable*	I totally messed the exam up. We were short of time, there were exercises we had never seen before.	I don't know what was going on with me. I didn't feel well, I may have a fever. I hope, I'll be able to correct the mark.
	Stable	I can never be good with N.; no matter what I count, he would give me a bad mark.	Failed again! I'm totally stupid, I'll never learn it!

Computer and linguistic competence as a pre-requisite of providing help by means of computer software

The psychological aspect, some features of which have been given or discussed above, is only a part of the set of pre-requisites necessary for meaningful use of computer software as an assistant in overcoming failures during study. More pre-requisites have to be regarded:

- basic mathematical and computer literacy of the student (user) – in the sense of effective use of possibilities offered by the software with a reasonable level of user comfort; this is a pre-requisite of not only finding a solution of the task but also of its correct (mathematical) interpretation,
- necessary linguistic competence enabling communication with the software in English.

We have studied these issues among students of Palacký University in Olomouc and Brno University of Technology since 2005/6. Some partial results of this research have been published by Novák, M. beginning with Novák (2005). The results confirm generally low level of linguistic and communicative competence of students in English, which to a great extent limits the use of computers in providing help in study. For example a great part of students of Faculty of Education, Palacký University suggests that work with texts in English in mathematical subjects (the teaching itself would be carried out in Czech) would mean great (71 %) or even insuperable (12 %) problems (responses to a questionnaire carried out among students of *Teaching mathematics at lower secondary schools* study programme in 2005/6).

Solving a mathematical task using Maple

Let us now demonstrate the importance of the above mentioned pre-requisites using an example all students of mathematics oriented study programmes come in contact with - the task of establishing the course of a function, which is a typical task solved during the introductory basic course of mathematical analysis. It is usually a climax of the course as when solving the task students have to apply knowledge obtained throughout the course.

Solving the task by means of Maple (in this contribution Maple 9.5, Classic Worksheet, which is a low enough version to be universally used, yet it is not obsolete) is easy – the following sequence is appropriate. Every first year student informed about basics of Maple and capable of using it should be able to prepare such a sequence either on their own or in a pair or a small group either during a computer class or as homework:

Fig. 1 *Sequence of Maple commands*

```
[> restart:
[> y:=1/(x^2-6*x+8):
[> pos:=solve(y>0): neg:=solve(y<0): zero_points:=solve(y=0):
[> first_derivative:=simplify(diff(y,x)):
[> increasing:=solve(first_derivative>0): decreasing:=solve(first_derivative<0):
[> stationary_point:=solve(first_derivative=0):
[> second_derivative:=simplify(diff(first_derivative,x)):
[> concave_up:=solve(second_derivative>0): concave_down:=solve(second_derivative<0):
[> inflexion:=solve(second_derivative=0):
[> subs(x=stationary_point,second_derivative):
[> Limit(y,x=2,right)=limit(y,x=2,right): Limit(y,x=2,left)=limit(y,x=2,left):
[> Limit(y,x=4,right)=limit(y,x=4,right): Limit(y,x=4,left)=limit(y,x=4,left):
[> k1:=limit(y/x,x=infinity): Limit(y/x,x=infinity)=k1:
[> q1:=limit(y-k1*x,x=infinity): Limit(y-k1*x,x=infinity)=q1:
[> k2:=limit(y/x,x=-infinity): Limit(y/x,x=-infinity)=k2:
[> q2:=limit(y-k1*x,x=-infinity): Limit(y-k1*x,x=-infinity)=q2:
[> asymptote1:=k1*x+q1:
[> asymptote2:=k2*x+q2:
[> plot(y,x=-infinity..infinity):
```

Two important questions occur in this respect:
– Who is going to prepare this sequence, which is going to be used to solve other tasks of the same type: a teacher or students?
– How are students going to use it when solving other tasks of the same type?

A questionnaire research among 245 first year BUT students gave the following result: the idea that such a sequence of commands as has been mentioned above should be prepared by students themselves was favoured by less than 10 % of students. Most students assume that the above sequence is prepared by the teacher – 47 % of students expect the ideal form of a computer-aided class to be changing values of some variables in such sequences, which in our case means changing the function in question. Further 59 % students expect to use such example files to solve specific exercises (which in this respect coincides with the former option).

This means – after certain generalization – that an important part of students finds being passive users, or rather "passive receptors" in the terminology of Lenke (2008), natural and assumes using a tool which they had not prepared (even though they are able to prepare it). They do not know the true nature of the tool, or rather find knowing it unimportant and redundant.

Students as passive computer users

Let us accept the idea of students – passive users or "passive receptors" and let us try to simulate their work with the above mentioned sequence of commands solving the tasks of establishing the course of a function. Let us assume a function $f(x) = 1/(x^2-6x+8)$. We want to find all the usual data: domain and codomain, sign, intervals of monotony, local extremes, intervals of concavity / convexity, inflection points, asymptotes and the graph of the given function. When solving the task students can meaningfully use a computer only when they had acquired necessary mathematical, computer, and linguistic competence. We are going to show this using several examples. The last command in the sequence is an obvious case. We draw the function on $(-\infty, \infty)$ but the acquired graph is naturally useless if the student is not aware of the interval to which he/she is supposed to restrict the graph. The student further needs to know if constrained or unconstrained view is better for the given function and has to deal with points of discontinuity. This, however, assumes basic level of computer as well as mathematical literacy of the student as they need to know which parameter to change and how to change it.

Fig. 2 *Possible form of results*

$$pos := \text{RealRange}(-\infty, \text{Open}(2)), \text{RealRange}(\text{Open}(4), \infty)$$
$$neg := \text{RealRange}(\text{Open}(2), \text{Open}(4))$$
$$zero\_points :=$$

Solving equations or inequalities is used throughout the sequence. Their solutions offered by Maple have the form as in Fig. 2. Students can interpret it correctly only if they have such knowledge of mathematics as to be able to assign some meaning to the results. Why are all the intervals in the figure open? What about points 2 and 4? Moreover, the student should know how to interpret the result on the last line (such a point does not exist or is there a mistake in the task?), which again assumes basic knowledge about the software the student is working with. The function used as an example has one stationary point. If the student chooses a function with more stationary points, performing the respective command results in an error. From the programmer's point of view this is natural as the student substitutes a variable of other than expected type. Yet what will be the response of a student, who had not prepared this sequence and who does not have appropriate experience in using the software? Will the student be able to correct the error, i.e. to understand the text of the error and subsequently find the relevant commands and their syntax in English written help if his/her level of English is not satisfactory? Experience coming from Novák & Langerová (2006), which deals with MATLAB, however, does not suggest high level of expected success. When looking for asymptotes we use variables asymptote1 and asymptote2. Correct interpretation of its values again assumes certain level of mathematical knowledge. Students should be ready to interpret the fact that their values are equal, are not equal, or that one of the values is or contains infinity. When looking for the vertical asymptotes students should be ready to tell the points in which the given limits are to be computed, i.e. they should be aware of the connection to the domain of the given function.

Let us conclude with the greatest risk which the student without necessary mathematical skills may face during computer aided practical classes. Meaningless changing of values or parameters may lead a student – passive computer user to totally wrong conclusions. If unable to assign mathematical sense to any of the interim results, or rather if unable to guess at least approximate re-

sults or their possible form, students can invoke an arbitrary result or arbitrary non-standard behaviour at an arbitrary place. A student – passive user with insufficient knowledge of mathematics cannot realise that values of variables or parameters had not been reset and takes the out coming results for granted, even though they are evidently wrong or even nonsensical. It is the belief that the values computed by a computer must be correct that is to be blamed.

Conclusion

We agree with the often suggested notion that implementing new technologies into teaching mathematics at all grades and types of school follows two interrelated aims:
– to make things, which have to be done anyway, easier both for the student and for the teacher, to help to understand nature of things and processes, to reach the principles of problems faster, more clearly and in a more effective way,
– to change the nature of education, in which new motivational environment with an easy and easily accessible offer of information, which the learner can use in a flexible and creative way, is to play a dominant role.

These aims can be accomplished only under certain conditions, some of which we have included in our contribution. A computer may provide help only to a student who does not willingly act as a passive user but has some experience in using the software and such knowledge of mathematics, which enable him to assign mathematical sense to acquired results, instead. If these conditions are fulfilled, a machine, or rather computer software can be a useful tool for higher level of success during studies of mathematics not only at universities.

In order to work meaningfully (not only to solve unexpected problems and situations) the student also has to have certain level of linguistic competence. If mathematical software is used repeatedly in an inappropriate way or for a longer period, a student – passive user with unsatisfactory level of English may very quickly form negative opinion as far as using mathematical software is concerned and may ignore it or reject using it in advance.

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Doc. PhDr. Bohumil Novák, CSc.
Faculty of Education, Palacký University, Olomouc,
Czech Republic
e-mail: bohumil.novak@upol.cz

RNDr. Michal Novák, Ph.D.
Faculty of Electrical Engineering
and Communication, Brno University of Technology,
Czech Republic
e-mail: novakm@feec.vutbr.cz

HEARING IMPAIRMENT AND ITS PROJECTION
IN THE INTEGRATIVE EDUCATION PROCESS

Miloň Potměšil

Key words

hearing impairment, a child, a pupil, education, integration, hearing impairment symptoms

Summary

In this article, the author presents information about the impact of hearing impairment on the efficiency of education. A pupil's performance depends, and thus varies, on the degree of hearing loss, and the conditions that require adjustments in order for such pupil to achieve the anticipated goals in training as well as in the educatory elements must thus change as well.

When speaking of educating children and pupils with hearing impairment, we assume the impairment to be the main source of the problem and thus the reason for seeking effective educational approaches becomes ever more evident. Owing to the current and continuously increasing integration trend, the following text concentrates on a group of children and pupils with hearing impairment whose lives have been exposed to the trend of integrated education. It pertains to a group, which has the conditions necessary for being able to achieve the highest possible level of learning on the one hand, but on the other, the very specific position of such children among a group of classmates must be taken into consideration, as well as the specific requirements for the conditions that bring about successful schoolwork. Let's try and display the specific symptoms of children with various intensities of hearing impairment, and thus also the specific requirements for adjusting the conditions and the environment where the education process takes place[1]. For our needs, we will create a group according to the extent of hearing loss; although in the conditions of our schools, the number of children and pupils with combined impairments whose education is much more demanding and in terms of very specific and often individual needs

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[1] As for special conditions in integrative education of the children with hearing impairment we can see a long list of various items. More about it see HULL, K., GOLDHABER, J., CAPONE, A. *Opening doors*. Mifflin Comp., Boston, MA. 2002

absolutely incomparable to the pedagogical work with a pupil displaying "only" one hearing impairment, is very much on the rise. These notes should also be useful for practicing integrated education.

Hearing impairments must be evaluated according to the degree of loss, stipulated in decibels (dB), and then the most suitable is hearing impairments classification from the perspective of loss in dB and frequency, in the regions of 500, 1,000 and 2,000 MHz, as stipulated by WHO, revised in 2001[2], where the following classifications are stated:
loss:
  0 dB–25 dB normal hearing
26 dB–40 dB mild hearing loss
31 dB–60 dB child – moderately severe hearing loss
41 dB–60 dB adult – moderately severe hearing loss
61 dB–80 dB severe hearing loss
81 dB and over profound hearing loss

Firstly, according to the degree of severity, let's mention minimal *hearing losses.* These are minimal hearing impairments, which may however in combination with other impairments prove to be unpleasant for all participants of the education process. These are most frequently occasional difficulties in following a conversation[3]. Another symptom may be unnatural displays of behaviour – "slowness" or on the contrary, excessive "precipitation" in reactions and common activities. These symptoms are caused by impaired hearing control of the environment. Elements of hearing deficiency may also become evident in communication with peers, especially in pre-school and younger school ages[4], when children are more in motion and are used to conversing while in motion. Interaction with peers may thus be affected even with slight hearing impairment. We mean especially the speed as one of the parameters for successful participation in communication process. In combination with other impairments or deficiencies, at some children we can monitor changes in variation of attention

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[2] *Primary ear and hearing care training resource.* World Health Organization 2006
[3] It should be reminded that school conversation, as a very specific version of conversation activities, differs from the general type conversation in its features and the communicating individuals' abilities to enter it. The main issue is the assumption that pupils should be following the teacher's conversation with their classmates and actively participate in this form of learning.
[4] TRAD, V. P. *Interventions with Infants and Parents.* A Wiely and Sons, Inc, N.Y. 1992

and fatigue[5]. Children belonging to such sets of values of hearing loss show increased defatigability. This is of particular significance at early schooling, where the condition can be confused with immaturity and unpreparedness for school work, which is detrimental to the child.

If within the previous group we talked more about indications and occasional difficulties then the group of children and pupils with confirmed hearing *loss of 26–40 dB* is the first one outside normal hearing. These deficits can remain unnoticed for a very long time, and all utterances of a child are then wrongly attributed to mental retardation. Such mistake may then irreversibly affect a child in the sense of incorrect placement in school, focused on educating pupils with mental retardation. Probably the most pronounced demonstration at these values of hearing loss may be the seemingly states of daydreaming or inattentiveness, caused by increased hearing strain. In this range of hearing loss, problems with orientation in communication and following its course is an expected symptom. In school communication there is another hindrance caused by reduced or completely lost ability of selective thinking. Children have difficulties mainly with communicating in a noisy environment, as the ability to suppress disturbing sounds and to resist acoustic smog is deficient or missing, which keeps on increasing in our environment. A negative element from the perspective of school work and socialization process quality is insufficiency in interacting with peers and surroundings. This is in addition to difficulties in following the flow of a conversation at discussions in a classroom during frontal work. This often culminates in one of the teachers' frequently repeated grievances such as: "...he/she does not know what we are reading, when asked...". More difficulties can be expected with dictations or other activities, based on listening and active participation in communication in a group.

It is a paradox that the first group, where we can be grateful to the hearing aid for fulfilling the function of a notice to the hearing communication partners, is a group of children with impairments ranging from *41–55 dB*. This is a category of children with hearing impairments where we expect fairly strong reliance on technical aid. In previous cases, it would be more of occasional difficulties, especially in an environment that is not completely suitable for the specific needs of persons with hearing impairment of the said parameters. Hearing loss in the range of 41–55 dB means a significant impairment in the communication process. If this is a congenital hearing defect, we must realise that communication process has already been compromised in the phase of its

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[5] GREGORY, S. *Deaf people in hearing world*. Walton Hall: The Open University. 1991.

development. The existence of motivation to communicate and communication development are very closely related to this issue. A hearing child is motivated to communicate from an early age also by the fact that he/she experiences the success and receives relevant and inspirational answers. In children with hearing impairment, this does not occur in the required extent – it has an especially negative effect during the entire period prior to effective compensation of the hearing impairment with a technical aid. There are effects that limit the socialization process, the impact of which is truly shown much later. Although these are children and adults who are hard of hearing, the process of integrating them into the society is negatively impacted by the hearing defect (even compensated). During research[6] conducted in 1997, it proved from analysis of responses acquired from adults who were hard of hearing that these people are not in all cases "happily" integrated, and their contact with persons with more severe hearing impairments is significantly restricted by their unreadiness to communicate in the sign language.

Constant dependency on a technical aid is one of the accompanying signs, characteristic for the stipulated group of persons[7]. One of the additional very ominous effects on communication efficiency is the acoustic quality of an environment, where the child dwells. Without due adjustments to the acoustics of such an environment and intervention in organizational forms, educating such pupils is much aggravated. It should be reminded that the project approach provides for individualising speed, environment conditions, and the socialization process. The increased defatigability should not be forgotten, and the pace of work and load must again be adjusted according to the pupils' individual needs.

The extent of hearing loss in the range of *56–70 dB* is a cause of problems, which manifest as a significant impairment of the communication process – in the sense of spoken speech communication. Hearing impairments in these values are manifested as a negative cause, producing significant difficulties in the socialization process. This means difficulties, which may be recorded even if a child is using a hearing aid and the degree of its efficiency is very high. Cogitation and speech development must be provided in the form of special education support. In our experience, we encounter children and pupils who are integrated and whose education takes place with the support of employees of special education centres and is basically successful. The term "basically" en-

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[6] POTMĚŠIL, M. *Národní výzkum úrovně vzdělávání neslyšících.* Research report RS 97–126, Praha 1998
[7] TAKALA, M. *They say I'm stupid, but I just don't hear.* University of Helsinki. 1995

compasses usually dramatic and remarkable engagement of not only the child's educationist, but also the child him/herself and the members of his/her family. The author is able to document cases from his experience, where integrated education at this degree of hearing loss was not successful, and the pupil transferred to a school for the hearing impaired, and the new social and educational reality, and sometimes even the need to use dormitory accommodation, was the cause of a severe psychic injury. Although we do not have any statistics on this matter, we dare to assume that these are usually the cases where integrated education was asserted by parents, who insisted on it despite different recommendations by experts. And again, in this group, we cannot omit the permanent dependence on technical aids, increased sensitivity to the quality of acoustic environment that the children with this intensity of hearing loss dwell and work in. One of the significant factors impacting successful socialization and later integration is the insufficient level of social maturity. Understandably, it is based on ineffective communication and retardation in cogitation and speech development. However, from our own experience we are able to document cases of children from this group, who were in the early age accorded sizable and effective tool of communication – the sign language, and these children prosper very well in all areas of mental development with direct positive impact on the results of education. Typical examples are children of parents with hearing impairment, who state the sign language as their first language. It may be stated for experts, who still doubt the advocacy of such procedure, that children guided in such manner also have significantly higher success rate in speech and language training and spoken speech communication. The reason for this is fairly simple: they have their language. Owing to the fact that we wish to remain objective in evaluating the results of communication development, we perceive it as necessary to state that there is an increasing number of children with the above stated degree of hearing loss, at whom absolutely trouble-free communication based on spoken speech was achieved upon a cochlear implant (especially at an early age). Again, it is the existence of a language, which developed into the phase of speech that ensures a high degree of socialization and integration for an individual with impairment[8]. From the perspective of psyche and personality development, it is rare to encounter the feeling of rejection and ineffectuality in these cases, as well as the subsequent reaction, which may be perceived by intact surroundings as spiteful, aggressive or even unacceptable. The most interesting cases from

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[8] HARRIS, M. *The Importance of Audition in Early Communication*. Nottinhgam UK: The Ear Fundation. 2003

a professional perspective are those of implanted deaf children, whose parents are deaf themselves.

Hearing losses in the range of *71–90 dB* are rated as profound, and although in some case, children are advised to use hearing aids, their contribution is not sufficient for spontaneous development of spoken speech. We speak of unsuitable level of communication competences with direct negative impact on the level of social ties in the child's immediate environment. If integrated education is taken into consideration, it is essential to bring attention to the specific preferences of peers and friends with the same type of impairment. In cases, where we encounter integrated education or training e.g. in the place of residence, we record fairly strong inclination towards younger partners for games or other types of joint activities. From the perspective of asserting integration, there is a threat of higher degree of social isolation and a strong inclination towards a group with similar type of impairment. For school work, there are some basic requirements: environment modification from the number of classmates' perspective, adjustments of the acoustic climate, specific methods and forms of work and higher level of the teachers' communication competences. In the previous text we dealt with integrated education of pupils with severe hearing impairments. It was revealed that even the highest degree of support – in the sense of a personal sign language interpreter, does not provide a guarantee for successful integration, nor is it a guarantee for effective education.[9]

Hearing losses *exceeding 91 dB* are rated as practical deafness or deafness. As the terminology used in practice is not unanimous, the intensity of hearing loss is determinant. When considering children and pupils with hearing impairments in this range, it must be said that communication preferences are very clearly, and in the majority of cases, consciously focused on the selection of partners for communication and joint activities from a circle of persons with hearing impairments that are of similar extent. The implication of a severe hearing loss in spoken speech or even the attempts for it is so obvious that we speak of the degree of social usability of spoken speech. No, we do not mean those segments of spoken speech, which are developed based on respectable, huge and mutual effort, expended during speech and language therapeutic care sessions, and its further continuation in a family. Instead, we mean the usability of speech in common and everyday situations, adequate to the child's age. If compensatory technology is used (however not cochlear implants), it is usually in order to utilise the trace residuals of hearing, which must be designed to make use

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[9] HARRIS, J. M. *Social Isolation of Deaf Adolescents*. PCP 548 Life Span Development 2001.

of any existing fragments of a sound field. It will, nevertheless, most certainly not be sufficient for developing spoken speech to the commonly expected level. The choices and preferences of communication partners suggest that in this case, the successful approach in education will be bilingual and bicultural. It is again for the purpose of objectivity that we remind such cases of children, where the cochlear implant helped and became a technical aid, which facilitated the child user with spoken speech communication, and led him/her all the way to successful integrated education. In order to maintain the ideological line of this text, we will remind the reader that it is the project education that has a high efficiency degree in such cases. It is also due to the fact that utilising the presence of teachers with hearing impairment is more likely to be considered and thus the focus of their communication preferences for utilising sign language[10] – hence the bilingual/bicultural programme.

If we are to summarise the most frequent difficulties pursuant to hearing impairment in children and pupils encountered most often, we can state the following:

− insufficiently saturated bank of terms, on which education is based,
− low level of communication competences,
− initiative and activity loss,
− signs of frustration,
− manifestations, perceived as elements of unsuitable behaviour,
− insufficiency in monitoring communication networks (inadequate reactions),
− manifestations of immature behaviour,
− trouble in interaction – inadequate effort,
− manifestations of tiredness, which are often perceived as daydreaming, inattentiveness, disturbance.

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[10] This is totally different comparing to philosophy of the oral approach in deaf education. See van Uden (leading person of that way) UDEN VAN, A. *A World of languages for Deaf Children. Part I. Basic Principles*. 3rd edition. Amsterdam. 1977

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Miloň Potměšil
Department of Special Education Studies
Faculty of Education, Palacký University, Olomouc
Olomouc

PROFESSIONAL PROFILE OF INDIVIDUALS
WITH DEVELOPMENT DISABILITIES IN SHELTERED
EMPLOYMENT SETTINGS: A METHODOLOGICAL CHANGE

Carmen Ruiz, Josep Maria Sanahuja, Patricia Olmos

Key words

Person with disability, sheltered setting, employment, main obstacles.

Summary

In this article we intend to explore individuals with intellectual and developmental disabilities in sheltered employment settings, the barriers they face when dealing with certain tasks and the difficulties they have in adjusting to them. With this purpose, we consider some barriers or difficulties produced by the combination of their personal traits, task work and employment settings.

Employment may generate improved lives and greater skills, but we must remember that a lifelong learning is a key tool in the development of the competences in order to face some labour market changes.

Our goal is to improve certain methodological strategies in order to develop the social and professional competences.

1. INTRODUCTION

Accessing the labour markets can be extremely taxing for disabled people, even more if the nature of their disabilities is intellectual.

Several factors are like obstacles to the inclusion of intellectual disabled people into the work settings. These factors include: (1) *personal*; coming from the disability itself and related to competence learning and development; (2) *social*; produced by a negative classification of competences and potentials; and (3) *labour*; stemming from the difficulties in responding to the requirements of dynamic, changing and competitive employment.

In Spain, the Special Work Centre (SWC) constitutes an alternative to social and labour integration of intellectual disabilities into sheltered employment settings. Their aim is to provide appropriate and continuous training for their

workers, promoting their personal and professional development to help them with the changes in the work settings.

SWCs are regulated by LISMI (1982) and the Royal Decree 469 (2006). Their main objective is to perform a productive work, developing a management regulated by the same standards and requirements applied to any company. To achieve that, their structure and organization must conform to those of any ordinary company. In these centers, the maximum number of disabled workers cannot exceed 70 % of the total workforce, excluding non-disabled workers in charge of personal and social adjustment of disabled workers. SWC presents a mixed and complementary nature: labour and social. From a labour point of view, their goal is to recruit disabled people with a legal level of disability (between 33 % and 65 %). In the social side, their aim goes beyond labour relationships, providing personal and social adjustment services as rehabilitation, therapies, formative or cultural services. Training centers cannot be limited to admitting people for training with the sole criterion of success in finding employment. A person is a whole and must be looked holistically (Cedefop, 2003)

There are several reasons to suggest that cognitive and adaptive behavioural deficits can interfere with the ability of people with intellectual disabilities to achieve their employment goals (Chwen-Yng, 2008). For persons with intellectual disabilities, disturbances have been documented in essentially all aspects of cognition, including measures of attention, memory, visual perception, language, and executive function (Fidler, Most, & Guiberson, 2005; Palmer, 2006; Purser & Jarrold, 2005; Vicari, 2004). The impact of cognition on work performance is more evident in other diagnostic groups characterized by cognitive impairment, such as schizophrenia (McGurk & Mueser, 2004). These studies showed that lower levels of cognitive functioning (cognitive skills, executive functions, verbal memory, and vigilance) are associated with more hours of job support and more contacts with employment specialists (McGurk & Mueser, 2006).

Specifically, the main obstacles we found are (Artigas-Pallerés, 2003; Bonal & Caparrós, 1994; Collet, 2003 and 2004; Dunn, 1973; Fenning et al, 2007; Jurado, 1993, 2007a and 2007b; Millas & Calderón, 2005; Shaw et al., 2005 Zetlin & Murtaugh, 1990):

- Lack of social skills (teamwork, communication, interpersonal relationships).
- Limited language.
- Low self-esteem.

- Emotional maladjustment.
- Low formative level (slower learning processes).
- Lack of basic competences and trouble to acquire them.
- Adjustment difficulties.
- Lack of flexibility.
- Low stress tolerance.
- Difficulties in improvising.
- Anxiety in unexpected and uncontrolled situations.
- Trouble performing difficult and non-repetitive tasks.
- Degree of dependence.
- Lack of self-determination and initiative.
- Difficulties with self management.
- The social benefits they obtain act as an inhibitor of labour integration.

In general, we identified obstacles of the following types:

- *Architectural*. Physical obstacles preventing the integration of people with physical or sensorial disabilities.
- *Social* and *cultural*. Social stereotypes belittling the capabilities and potential of disabled people, especially intellectual disabilities.
- *Educative*. Low formative levels, especially in individuals with intellectual disabilities.
- *Legal*. Lack of more specific regulations for the labour integration of disabled persons in non-sheltered employment settings.

The goal of this study is the identification of formative needs to guide and define actions into the SWCs, in order to improve the personal and professional conditions of intellectually disabled people. So we need to consider some matters like workplace requirements, their differential conditions, and the SWC. However, this process must be implemented from a point of view of basic competences starting with the job task and the workers' personal and professional situation.

2. PROCEDURE

2.1 SAMPLE

The study arises from the requirements of the *Coordinadora de Tallers per a Minusvàlids Psíquics a Catalunya*; a private non-profit organization acknowledged by the government, with 63 centers (occupational centers, special work centers and supervised home). The *Coordinadora* is as a mediator between the social and labour integration sectors of intellectual disabled people.

- Sample in the study: 17 SWC (26.98 % of total number of centers).
- Sample population: 229 workers in the 17 SWCs.

2.2 INSTRUMENTS

Three types of instruments have been used for this study:

- Questionnaires: have been delivered to 90 % of the employment specialists and 10 % of the workers in the SWCs. The items are related to: personal, formative and professional variables; need analysis, initial and continuous education; and degree of mastery and importance in the basic competences (linguistic communication, mathematics, interaction with the environment, digital, labour, learning to learn, sense of initiative and entrepreneurship, and social and civic).

- Interviews: conducted with employment specialists and managers in the 17 SWCs. It comprises the following sections: Description of professional tasks, motivation, education, activities and skills, improvement of the workplace.

- Observation of workplaces according to the different professional families in the SWCs.

3. RESULTS

3.1.1 Personal variables

64.9 % of the sample is male and 35.1 % is female. This data is supported by studies performed in Cataluña by the ONCE Foundation (2004), where we can find that in 1996-2001 male hiring represents 58.5 %, and female hiring 42 %.
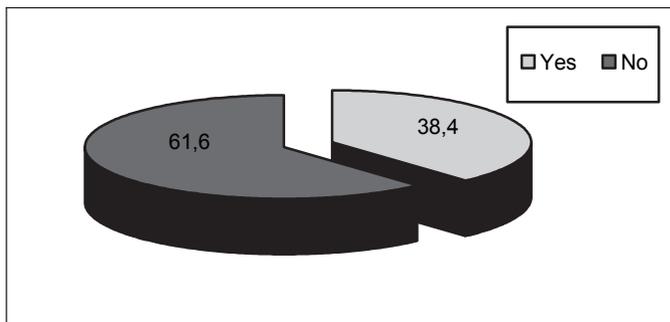
Graph Gender
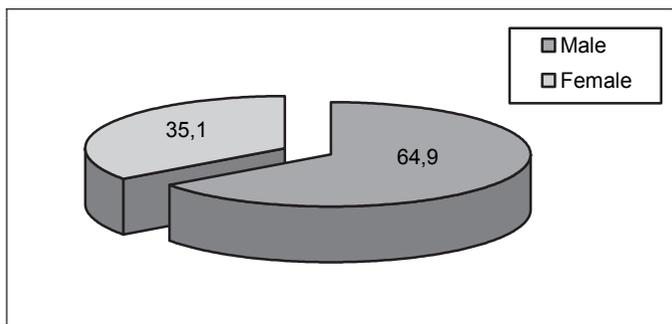
In the **type of disability** there is a clear prevalence of intellectually disabled people; representing 88.6 %; and 11.4 % with mental illnesses (schizophrenic, psychotic...).

Graph Type of disability
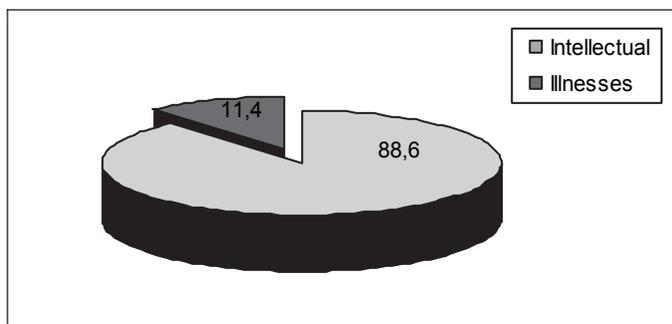
Finally, 38.4 % of the individuals in the sample received some medical **treatment**.

**Graph** Receiving medical treatment

3.1.2. **Formative variables**

64.5 % of individuals have basic or primary education in the Spanish educative system: 31.9 % have a primary education diploma and 32.7 % a certificate of primary education. Only 10.1 % have secondary education, and less than 1 % went to the university

It is important to note that the percentage without education in our sample is 24.8 %.

Graph Degree of studies
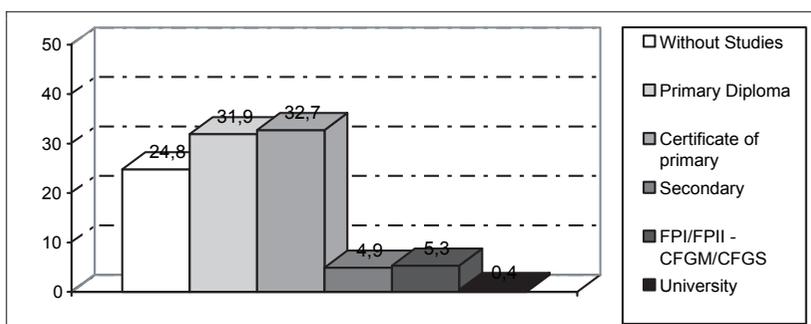
3.1.3. Professional variables

We identify mainly nine **professional families** in the SWC

The more representative is manipulating/assembly (33.2 %) and gardening (31 %). The others professional families vary between 4 % and 8 % of the total in the sample, except for professional families directly related to service and customer service areas; office and catering; representing only 2.2 % and 0.9 %.

Another area to be considered in the professional variables is some **distinctive professional tasks**, as shown in the following table:

Table Professional families and their representative tasks

PROFESSIONAL FAMILY	REPRESENTATIVE PROFESSIONAL TASKS
Laundry	Ironing, folding and packing clothes; management, pickup and delivery of orders and invoice handling.
Woodworking	Chain tasks in wood production: supplies, stacking, gauging, frame mounting, nailing, milling, polish, pressing, drilling, cutting, etc.
Office	Switchboard operation, mail handling, copying, auxiliary services tasks and customer service.
Services maintenance	General maintenance, cleaning, cartridge control, toner replenishment, etc.
Catering	Dining room and kitchen cleaning, table waiting and food service.
Gardening	Park and garden maintenance, and basic cleaning and care tasks for green area maintenance with specialized machinery, tools and products.
Roads and highways	Highway maintenance, signal installation and flagging.
Manipulating/ assembly	Assorted tasks according to product: manipulation and testing of windows, switch and electric circuit installations, serigraphy, labelling, quality control etc.
Cleaning	Cleaning of offices, homes, production facilities, automobiles, washing tunnels and basic parking lot maintenance.

Graph Professional families
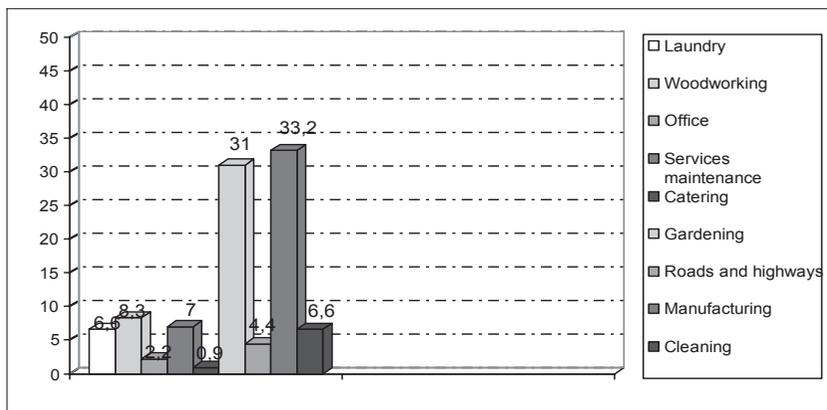
Finally, the workers consider some strong and weak features in their professional tasks. Some of these are shared by all the professional families, and some are specific to each family.

**Table** Strong and weak areas common to all professional activities

STRONG features	WEAK or IN NEED OF IMPROVING features are:
Perseverance, responsibility and willingness	Monotony and lack of initiative
Quality of work	Distraction and lack of concentration
Interest and motivation	Slowness in the performance
Task diversity and possibility of changing activity	Low self-esteem
Team work	Non-competitive wages
	Troubles in learning new tasks and adapting to them
	Need of constant support

Table Specific strong and weak areas in each professional family

PROFESSIONAL FAMILY	STRONG features	FEATURES TO IMPROVE
Laundry	*Type* of *activity* (know how to iron, fold, pack clothes...).	*Physical strength, re*sistance *ability*.
Woodworking	*Personal traits* (flexibility, learning ability, curiosity...) *Type of activity* (tools, materials...)	*Low adaptability* to the workplace and teamwork. *Lack of* motor and emotional skills.
Gardening	Relationships with fellow workers. Traits of the *person* (physical strength, physical and cognitive skills). The workplace (time, resources, tools, appropriate environment).	*Type* of work (tired and exposed to environmental conditions) *Traits* of the *person* (emotional instability, low tolerance to frustration...)
Manipulated	Type of activity. *Machinery operation.* Learning skills.	*Personal characteristics* (excessive sensitivity, lack of civility, dependence.)
Cleaning	*Punctuality in* the job Sociability.	*Allow the influence* of other workers.

According to the **professional categories** of the subjects in the sample 93 % belong to the labourer category, 6.2 % to specialist and the remaining 0.9 % to other categories.

Graph Professional category
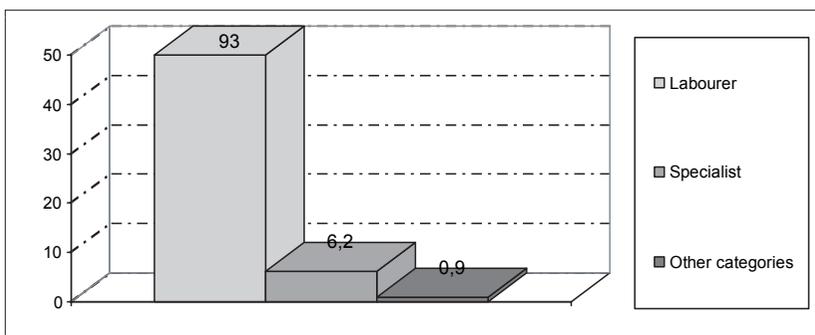
In reference to **working hours** we see that 44.2 % of the sample work in the morning (6.00/7.00 h – 14.00/15.00 h); 7.2 % in the afternoon (14.00/15.00 h – 21.00/22.00 h); and 48.6 % in a split working day (8.00/9.00 h – 17.30/18.00 h).

In type of **work contract**, 92.1 % have an open contract, compared to 7.9 % of temporary workers.

In **wages** the earnings are, in general, low. 70.6 % thinks it is not enough, 29.4% say it is.

In **support needs** in the workplace 53.1 % need three types of support, in any professional activity. These are:

- Verbal, gesture and/or emotional support.
- Supervision and/or control on the task.
- Support to organize and assign tasks.

In the variable, **continuous education** in and for the employment, 72.1 % in the sample receives some training, which is adequate and sufficient.

Graph Importance and mastery in basic competences
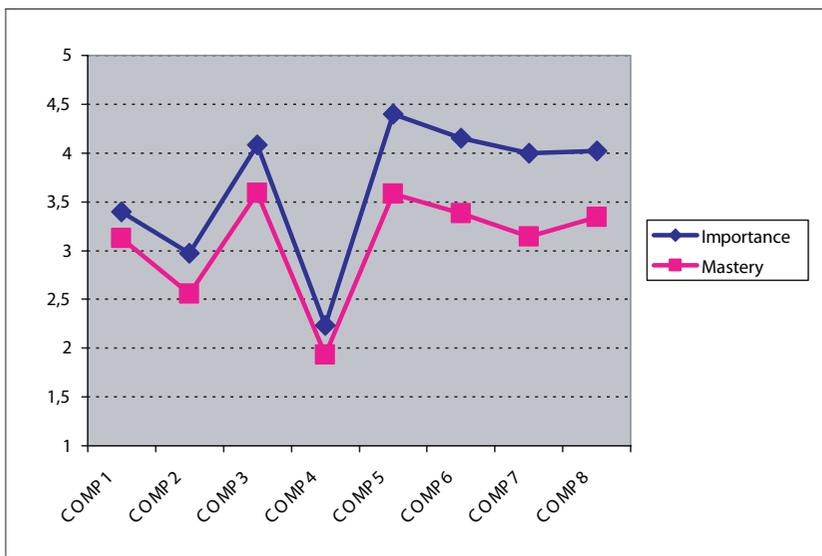
In reference to the level of **mastery and importance of basic competences** (linguistic communication –comp1-, mathematics –comp2-, interaction with the environment –comp3-, digital –comp4-, labour –comp5-, learning to learn –comp6-, sense of initiative and entrepreneurship –comp7- and social and civic –comp8-), digital competence receives the lowest degree of importance and labour competence the highest. This result is consistent with the main professional profile of SCWs. When the disagreement between importance and mastery is greater, the need of training is greater too.

4. CONCLUSIONS

An analysis of formative and professional variables allows us to think that there is a relation between the professional categories (93 % are *labourers)* and *formative levels* (64.5 % have a primary studies). There is no doubt that one of the main disadvantages for people with some disability (low formative level) has an important impact on the professional category.

57.1 % of the workers in the sample think they have some *possibility* of *promotion* in the company, and 42.9 % think they do not. However, their motivation is high; almost 92 % think so. We must remember that work helps disabled people access more open and competitive social and labour settings.

In reference to the *conditions* in the workplace at the sheltered centers we can note that:

- Trainers plan the tasks, provide guidelines to the workers and assign tasks to be performed according to their level of autonomy. This gives the disabled workers more confidence in their functions and job responsibilities. This hinders the capacity of self-determination.
- The climate and environment in the workplace are positive. Safety rules are observed and the workers receive personal protection equipment. However, disabled workers suggest an improvement in accessibility to help them overcome the architectural obstacles.
- There are some jobs, like gardening, which are well respected by workers and the institution, but do not improve promotions or wages.
- There is an evident need to increase the self-esteem of disabled workers, one of their main obstacles.

- It is important to promote off job activities and provide guidance on the use of free time to improve the social skills.

Finally, the training of workers needs to adapt to possible changes in the workplace and improve their efficiency. This efficiency will depend on the task and/or professional family and their personal development. Formative requirements could range from courses related to the environment, ecology, use of machinery, safety, to social skills, management, accounting, languages or computer.

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Sanahuja, Josep M.
Olmos, Patricia.
Ruiz, Carmen
Department of Applied Pedagogy
Autonomous University of Barcelona

ON MATHEMATICAL IMAGINATION
OF PRE-SCHOOL AGED CHILDREN

Anna Stopenová

Abstract

The kindergarteners do not systematically teach mathematics – they rather shape mathematical imagination, or more precisely the ability of children to view the world through obtained knowledge, experience and interrelations and to apply laws of thinking.

1 Introduction

The elements of mathematics appear in practical life and pre-school aged children get them know intuitively. For example they gradually learn to denote the positions of the parts of their bodies in relation to themselves, but also to other objects or objects in relations to themselves, then they count how many brothers or sisters they have or how old they are and show the number on the fingers of their hands etc. Someone might argue that this is not mathemetics. Well, but these are the very beginnings of mathematics children come across.

2 Some psychological aspects of mathematical imagination

The elemental forms of perception start to develop very soon. For pre-school and junior school aged children there is characteristic detailed perception and rich feeling. Immediate connection of percept with tasks is characteristic and an indispensable condition for the development of the child's receptivity.

In a kindergarten teachers concentrate to the development of the basics of cognitive processes, it means receptivity, perception, thinking, imagination based on speech, attention and memory. Together with the development of knowledge children develop intelectual skills and the beginnings of intelectual habits. Children watch carefully what attracts their attention and very often remember their experience. The development of learning and knowledge goes through the whole life of a child. Children are influenced not only by a kindergarten, but mainly by a family and many other, very often random factors.

It is highly probable that the first eye impressions are flat, two-dimensioned, and the child gets to the three-dimensioned perception through the complicated experience of touch, kinesthetic and ear, while eye experience is dominating.

V. Příhoda [3] states that the shape is probably more important for the child than the colour. The research has proved that 3 years old children sort out objects according the shape rather than colour, while children aged from 3 to 6 are influenced more by colour. For example children look at various geometric shapes in various colours. If we show them a white triangle and ask them to choose an identical one from an amount of other shapes, we find out that children in the mentioned age group more often choose the shape of the same colour, it means, they choose i.e. a white square. At the beginning children distinguish only basic colours (red, white, black). Very soon the ability to distinguish the size of the objects develops. Children at the age from 3 to 4 years can choose also the biggest and the smallest object. As late as at the age of 5 the child can point to the objects of a middle size. The space orientation (distinguishing distance, direction, size, shape, colour and noise) is nearly perfect at the end of the third year.

Forming of the perception of space quality of the objects demonstrates itself mainly as the integration of the sight and touch. In the early childhood the perception developes from the notion in the gradual stratifying of more and more complicated psychical formations. In the time when the function of imagimation and thinking starts to take place, perception can be modified through their influence. On the other hand the early childhood appears as a period mainly of the perception i.e. „piling" of the elementary experience and also as the period when the abstract thinking is not applied yet.

With precising and with the coordination of the child's movements and improving of the eye and movement apparatus there enlarges also the space and time frame for the use of perception operations. With the help of didactic material (both artificial and natural) children get acquainted with the properties and there are partly formed conditions for forming perception operations aimed to investigating of these properties. Children get senzoric notions from the world around. They get acquainted with the sourranding objects, their properties and simple relations while manipulating with them. While playing their spontaneous and didactic games, children are led to practical distinguishing of objects according to the properties (size, colour, shape) which are perceived by receptors and are led to the elementary „understanding" to space relations between watched and perceived objects.

While playing, children gradually start to catch next, even more complicated relations and contexts, they start to apply imagination and objective thinking. We introduce the activity of „putting in" and „taking out" of smaller objects from a bigger vessel, pushing of various objects to holes of various shapes, we let children watch the objects from various sides, (in this way we make early exercises to practise the first understanding of the position, distance and the space). We try to develop the abilities of children to express simply the reality with the help of some building material (cubes) and build according to an elementary intention. In cooperation with the adults we try to lead children to concrete understanding of denoting of the relations in the space (upstairs,downstairs, in the middle, at the side). In real everyday situations we teach children to understand often used designation of positions, location in the space. We lead children to react to various instructions to change the place, position (of objects, people). We lead them to recognize well known objects in the picture (and also in simple relations). We try to develop the elements of purposefulness in games (especially in constructive and imitative ones).

3   Mathematical imaginations and notions of pre-school aged children

The instruction of pre-school children in the area of the development of mathematical imaginatiincludes these parts:

- orientation in the space, relations among objects in the space and in the plane,
- forming of groups of objects (sets), relations among sets, operations with them,
- relations among the groups of objects,
- sorting, arranging, adding,
- gradual getting acquainted with numbers.

Children learn gradually to understand space relations through which we denote the position of their bodies (parts of the bodies) in the space, the position of the things in the space and posibilities of the situation change. That is why it is necessary for them to conceive correctly and then use correctly the prepositions: *on, in, above, below, before, behind, next to, between, among, in front of, facing, upstairs, downstairs, high, low, far, near, inside, outside, ahead, at the back, in the middle, on the right, on the left.* With the help of these words children learn to describe and decide: About their position in the space, about the

situation of objects in relation to their own person, about the mutual situation of two objects. Then they are going to describe and decide about the situation in the plane (the basis of the related system will be a certain object, this time drawn). In the real situations of everyday life we teach children to understand often used designations of positions, location in the space. We lead children to react to certain situations, to change the place, the position (of things, persons). They are lead to recognize well known objects in a picture (also in simple relations). We try to develop the elements of purposefulness in a game (especially in a constructive and imitative one).

All geometric knowledge is mediated to children through games and various manipulative activities with the aim to master the necessary apparatus to express space relations in the real life. Gradual getting acquainted with geometric shapes is supported by comparing the shape of objects, sorting of objects according to some shape, looking up of some shapes among various shapes etc. Shapes properties are acquired by children especially in activities with objects, their touching, modeling, moulding and shaping, drawing, cutting and sticking on. We get children acquainted with geometrical notions in a natural and intuitive way. In pre-school age their performance is not professional and precise yet. But it will express the real level of their imagination and the grade of the abstraction at gradual forming of geometrical shapes.

Pre-school children gradually get acquainted with the names of numbers (they reckon, say the numbers in a line) and with their quantity meaning (they denote the number of objects), with the filing of numbers according the size (they know a row of numbers from the smallest to the biggest) and partly with reading and writing of numbers (some can read and write some ciphers). Children perceive numbers 1, 2, 3 as a frequent reality, current in everyday life and learn them directly as real facts. The groups of one, two or three elements are easily overlooked by children, they can say the names of the single elements correctly, they can match an exact number of objects to a number in the speech. Numbers one, two, three occur very often in counting rhymes, nursery rhymes and songs. In a kindergarten children learn to enumerate according to their experience. Children should also be able to count objects in the given set, respectively to form a set of objects of a given number of elements (up to six, eventualy in the first ten).

The notion of a number, it means the abstraction of a number of an elements group is not possible to create in a different way than by generalizing of a big number of concrete cases and situations. As we have already written, a pre-scho-

ol child perceives and understands numbers 1, 2, 3. It gets to others gradually in such a way that together with suitable instruction and explanation adds one element to a group of elements of the number, which was practised lately. In this process we use objects well known or familiar to children (3 apples and 1 apple are 4 apples). After explaining and practising an appropriate number of examples with real objects, we pass to object counting in pictures, to plane pictures and only after that to schemes (dots).

What should a teacher notice while checking the quality of numerical imaginations?
- To what number the children can count – how much they know the number line.
- What is the highest number of objects they can count.
- To what number expressed verbally (a number) or by a graphic term (by a cipher) they can show the correct number of objects.
- If they can solve some very elementary numerical tasks. Adding (or taking off) one element.
- How many identical elements (things, cases) they can guess and express at once.

Children can obtain the ideas of the object size (dimentions – length, height, width) based on their own experience in simple measuring (i.e. stepping), guessing or mutual comparing dimensions. They set the destination of their journey, the intercourse and way, they solve puzzles in the space and the plane, they realize solutions of the situations with the opened and closed lines (topological propedeutics). Children acquire notions of elementary geometrical shapes in the space and the plane, they distinguish them (or sort them out) on the basis of visual and tactile perceived difference (a circle, a square, round and square objects). Motoric skills are developed through the forming of the space models and patterns of real situations, with the use of brick boxes or a meccano and games with elements of creativity, fantasy. Fantasy developes also at graphic reproductions of the concrete reality – drawing, completing pictures or drawings etc. Propedeutics of relations and of depicting (sorting out, filing out, adding and arranging) can be seen at manipulative activities with real objects. Gradually, with the help of real activities with objects they get the notion of a natural number and numerical operations. A very important place is occupied by some

set of "mathematical competence" of the child at the entrance to the 1st grade of the elementary school.

Mathematic abilities and skills of children can be developed in the best way while playing. A game belongs to natural and the most favourite activities of children. It is necessary to have ready a great amount of didactic toys (games) and while using them, it is necessary to keep to the above mentioned rules.

4   Conclusion

On the basis of the development of mathematical imagination of pre-school children it is possible to improve the quality of the school readiness – a precondition of successful mathematics teaching at elementary schools.

After 1989 there have been various changes in education, many kindergartens have been closed. Not all pre-school children attend kindergartens, it is not compulsory to insert regularly into child's work the activities which would systematically develop the intelectual and mathematical notions and imaginations together.

Current practise of kindergartens goes in the way of the development and acquiring competences. While educating children the development of their abilities, skills attitudes and values as well as enlarging of their learning is supported. Special stress is on the activities in the frame of which children solve, discover, make experiments. These activities can be intelectual or practical ones, more formative or informative, they bring to children, develop or fix the knowledge which is a natural part of pre-school child's competence. The activities should bring to children such knowledge, which is purposeful and understandable, which helps them to understand better the world around and to understand its running, knowledge practical and useful for everyday life, for further studies and learning and so the knowlege which corresponds to the frame of the educational and life needs of pre-school children and which they should master. [2]

On the basis of the contents of pre-school education aimed for the age group of 3 to 6 (7) years it is necessary to adjust the instruction of pre-school pedagogues. Educational contents represent a compact, whole unit which can be stratified to the following areas: a child and its body, a child and its psychology, a child and the other person (partner), a child and a society, a child and the world. The didactic style of children upbringing in kindergartens should be based on the education choice and active participation of the child. A pe-

dagogue should be a guide of the child on its way through learning,wake up its active interest and the willingness to look around, to listen and to discover, not the one who sets tasks and checks the fulfilment of them. A pedagogue is set a task – his main task should be to suggest suitable activities, prepare the enviroment and offer to the child the opportunities how to get to know, think over, see and understand itself as well as to everything around in the more and more effective way. [4]

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PaedDr. Anna Stopenová, Ph.D.
Department of Mathematics,
Faculty of Education,
Palacký University, Olomouc
Žižkovo nám. 5, 771 40 Olomouc
Telefon: +420 585 635 711

TASKS IN NATURAL SCIENCE TEXTBOOKS

Olga Vránová

Abstract

This article contains results of the task evaluation in natural science textbooks. There were analysed ten textbooks of the Alter, Fortuna, Nová škola, Prodos and SPN publishing companies. The attention was paid to number, difficulty and diversity of tasks in each textbook. The difficulty of tasks was classificated according to Tollingerová. The results showed – the difficulty of tasks were similar in all evaluated textbooks. The most frequent were tasks of simple cognitive level. Differences were obtained in number and diversity of tasks.

Key words

Natural science textbooks, task evaluation, task difficulty, task diversity

Abstrakt

Článek soustřeďuje výsledky rozboru úkolů v učebnicích přírodovědy. Předmětem hodnocení bylo deset učebnic přírodovědy nakladatelství Alter, Fortuna, Nová škola, Prodos a SPN. Hlavní pozornost byla věnovaná počtu, náročnosti a pestrosti úloh. Obtížnost úkolů byla klasifikována podle taxonomie Tollingerové. Bylo zjištěno, že náročnost úloh je podobná ve všech hodnocených učebnicích. Nejčastěji se vyskytovaly úkoly vyžadující k řešení pouze jednoduché myšlenkové operace. Studované učebnice se lišily počtem a rozmanitostí úkolů.

Klíčová slova

Učebnice přírodovědy, hodnocení úkolů, náročnost úkolů, rozmanitost úkolů

Introduction

The term task is very often used in psychological and pedagogical literature. It is very common used to mark different questions, instructions, examples, exercises, that serve to achieve the educational aim (Holoušová 1997, Průcha–Walterová–Mareš 1995, Mazáčová 2004). Educational tasks take an important part of a lesson and have different functions in it (for example revision and practising, fixing of obtained knowledge). Learning tasks are the most important

tools for a teacher to realize a feedback (Trna–Trnová 1998). Teachers obtain a value of knowledge and a level of acquire by pupils. According to a pedagogical practice is clear, that learning tasks should take part of all phases of educational process. They should form a spectrum of tasks to mobilize different parts of a pupil thinking, but our researchers show that it is not so very often (Čtrnáctová 1997, 2002, Mazáčová 2004, Ušáková 1994).

Material and methods

Actually, there are five publishing companies (Alter, Fortuna, Nová škola, Prodos, SPN) in the Czech Republic, producing textbooks for natural science teaching. I realized the task analysis in textbooks for fourth and fifth grade. Totally were examined five textbooks for fourth grade and five for fifth grades (the textbook of Alter publishing company has three volums). The task analysis was concerned on their number, difficulty and diversity.

There are classifications according to Mareš (1980), Ušáková (1994) and Tollingerová (in Kalhous – Obst 2002). I used classification according to Tollingerová, because it is the most detailed. It contains 27 types of tasks, given in 5 groups according to their increased difficulty level. The easiest tasks belong to the first group, the most difficult ones take part of fifth group. Particular types of tasks are signed by means of decimal classification. Different kinds of tasks in each textbook were calculated in percentige. Results are written in graphs 1 and 2.

Results

The task analysis in textbooks for fourth grade

According to the task analysis in textbooks of five publishing companies were obtained these results. Tasks and questions were located in the text of subject matter. Only in the textbook of Prodos publishing company tasks were situated at the beginning of chapters or theme units.
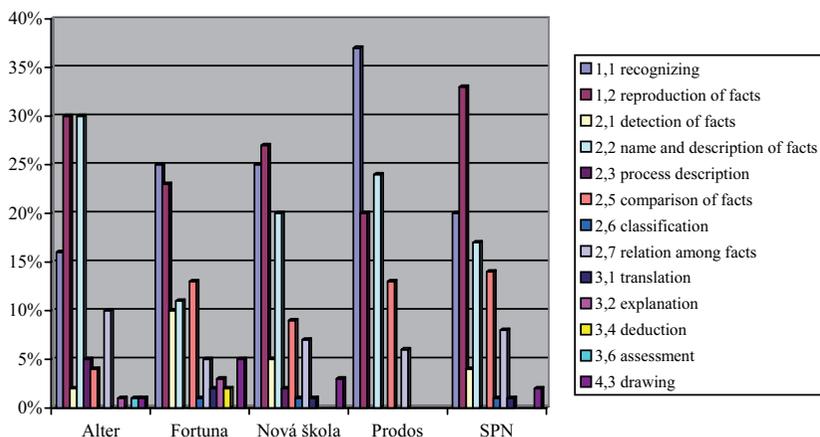
Number of tasks was different in different textbooks. A little tasks (117) were in the textbook of Prodos publishing company and the most tasks (630) were found in the textbook of Fortuna publishing company. So high count as in a textbook of Fortuna publishing company is characteristic for textbooks from sixth to ninth grades.

The easiest tasks were more frequent than difficult tasks in natural science textbooks for fourth grade. Different types of easy tasks were given into a group of tasks for memory (first group of tasks) and into a group required easy thought

operations with knowledge (second group of tasks). These tasks represented (depending on textbook) 88–100 % of all tasks (see graph 1). Difficult types of tasks were very rare, for example tasks for derivation, deduction or reason and creative thinking. Some difficult types of tasks (for example tasks for translation, explanation, deduction and assessment were found in textbooks of Alter, Fortuna, Nová škola and SPN publishing companies. Their number was not higher than 3–12 % of all in a textbook (see graph 1).

There were found a differences between the diversity of tasks in different textbooks. The textbook of Fortuna publishing company had the greatest diversity of tasks. There were found 11 types of tasks. A textbook of Prodos publishing company had minimal types of tasks (5). According to the types of tasks, some of them had a high frequency of occurence. They were tasks for recognizing (type 1,1), reproduction of facts and terms (type 1,2), name and description of facts (2,2), comparison of facts (type 2,5), relation among facts (type 2,7).

Graph 1 Task proportion in different types of tasks (natural science textbooks for 4th grade)


The task analysis in textbooks for fifth grade

Similar results like in textbooks for fourth grade were obtained. Tasks and questions were located in the text of subject matter. Only in the textbook of Alter publishing company tasks were situated at the end of chapter or theme units.

Number of tasks was different in different textbooks. A little tasks (205) were in SPN publishing company and the most tasks (508) were found in the textbook of Fortuna publishing company.

The easiest tasks were more frequent than difficult tasks in natural science textbooks for fifth grade. Different types of easy tasks were given into a group of tasks for memory (first group of tasks) and into a group required easy thought operations with knowledge (second group of tasks). These tasks represented (depending on textbook) 91–100 % of all tasks (see graph 2). Difficult types of tasks were again very rare. Some difficult types of tasks (for example tasks for translation, explanation, deduction and assessment) were found in textbooks of Alter, Fortuna, Nová škola and Prodos publishing companies. Their number was not higher than 2–9 % of all in a textbook (see graph 2).

There were found a differences between the diversity of tasks in different textbooks. The textbooks of Fortuna and Nová škola publishing companies have the most diversity of tasks. There were found 10 types of tasks. A textbook of SPN publishing company had minimal types of tasks (7). According to the types of tasks, some of them had a high frequency of occurence. They were the same tasks as in textbooks for fourth grade (tasks for recognizing, reproduction of facts and terms, name and description of facts, comparison of facts and relation among facts).

Graph 2 Task proportion in different type of tasks (natural science textbooks for 5th grade)
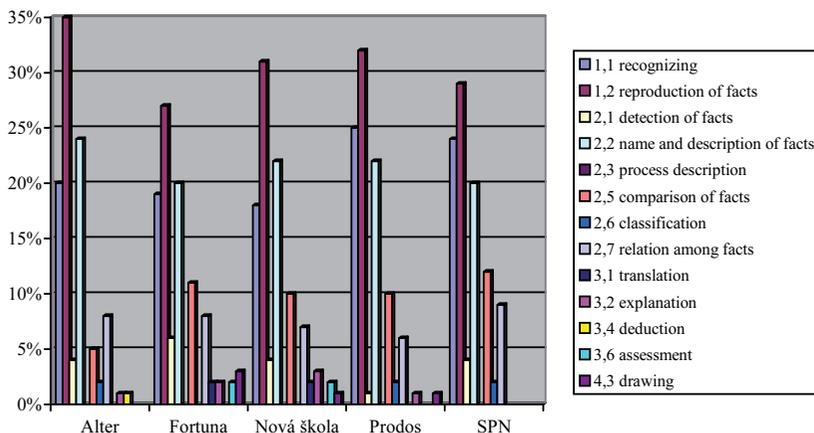
Conclusion

According to analysis of tasks it is possible to mention that the task difficulty is similar in all evaluated natural science textbooks. The most frequent tasks are for recognizing, reproduction of facts, name and description of facts and comparison of facts. In contrast, tasks for translation, explanation, deduction or reason and assessment are very rare. Task diversity is suitable for pupils of fourth and fifth grade of primary education.

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RNDr. Olga Vránová, Ph.D.
Department of biology,
Faculty of Education,
Palacký University, Olomouc
Purkrabská 2
771 40 Olomouc

AXIOM OF CHOICE'S CONSEQUENCES FOR METHODOLOGICAL MATERIAL IN MATHEMATICS TEACHING

Tomáš Zdráhal

Abstract

The article deals with one effect of the Axiom of Choice's bearing on understanding how to get better insight into traditional mathematical notions and concepts. It is shown that the investigation of a special function brings didactic and methodological mathematical material for the demonstration of the modern concept of teaching mathematics at universities.

Key words

Homomorphism, functional equation, Cauchy equation, Axiom of Choice, Hamel basis, discontinuous additive function.

The main idea of this article is to show, by means of a special non-trivial mathematical function, that it is not possible to raise mathematics as the science only on the basis of intuitive notions and concepts. To show, that the basic implement for an acquirement of knowledge in the mathematics is the language of mathematics and that this implement is so much preferred, that every knowledge obtained in different way, e.g. on the basis of an observation, an experiment, an intuition, a sense, etc. is considered to be the mathematical knowledge only when it is proved by means of the language. To show, that the acquirement of new knowledge only by consideration is characteristic of mathematics; this makes mathematics to be exact science in letter. Each other science is exact only to the extent, to which it uses just mathematics. Because of the scope of this journal there will not be any mathematics; only the didactic background of some mathematical consideration (for mathematics see e.g. [7]) in this article.

Let us start with the fact that just general linear function could be the very suitable function to demonstrate the facts above mentioned. In spite of our words saying there will be no mathematics in this paper, it is necessary to introduce at least few the most important mathematical concepts essential for our considerations understanding. What do we mean by general linear function then?

Definition

   A function f: $\mathbf{R}^N \to \mathbf{R}$ *is called general linear iff it is of the form*

$$f(x) = f_a(x) + b, \, x \in \mathbf{R}^N,$$

where f_a is a homomorphism of the linear space $(\mathbf{R}^N, \mathbf{Q}, +, \cdot)$ *into the linear space* $(\mathbf{R}, \mathbf{Q}, +, \cdot)$ *and $b = f(0)$.*

Thus f_a: $\mathbf{R}^N \to \mathbf{R}$ is additive, i.e. it satisfies Cauchy's functional equation

$$f_a(x + y) = f_a(x) + f_a(y)$$

for all $x, y \in \mathbf{R}^N$.

Theorem

   Let H be an arbitrary Hamel basis of the space $(\mathbf{R}^N, \mathbf{Q}, +, \cdot)$. *Then for every function g:* $H \to \mathbf{R}$ *there exists a unique additive function f:* $\mathbf{R}^N \to \mathbf{R}$ *such that f | H = g.*

This assertion gives the general construction of all additive functions *f:* $\mathbf{R}^N \to \mathbf{R}$. In fact, every additive *f* may be obtained as the unique additive extension of a certain function *g: H→*$\mathbf{R}$ that is g = *f* | *H*.

   It could be shown (see again [7] and [8]) additive (and general linear) functions bring didactic and methodological mathematical material for the demonstration of the modern concept of teaching mathematics, which is a good opportunity for the teacher to encourage and develop creative powers of students. Besides, mathematicians are as well attracted to functional equations by their apparent simplicity and harmonic nature, which may conceal the possibility of obtaining important mathematical results. Actually, the very theory of functional equations (and additive functions are solutions of the fundamental functional equation) raises a wide range of mathematical problems whose solutions have not only the formative effect, but also an informative one — in other fields of mathematics. The specificity of solving these problems lies in the fact that although we can use our already gained knowledge and skills in order to solve them heuristically; we cannot base our solutions on concrete geometric image however. We are therefore faced with the necessity to prove our hypotheses in an exact way, which is very valuable and desirable. Why cannot we rely on the

geometric image here? Because our solutions come from the existence of discontinuous additive functions. There is necessary to put on an explanation here.

For many years the existence of discontinuous additive functions was an open problem. Mathematicians could neither prove that every additive function is continuous nor exhibit an example of discontinuous additive function. It was only thanks to the development of the set theory in the beginning of the 20th century that the existence of a discontinuous additive function could be proved. It was G. Hamel who first succeeded in proving this fact. The proof is based on the existence of a special set of elements from $\mathbf{R}^N$, today called a Hamel basis of $\mathbf{R}^N$. Its existence follows from the Axiom of Choice. It means however that no concrete example of such base is known, i.e. effective examples of discontinuous additive functions do not exist.

These results are not the very trivial. However, our goal is to investigate neither mathematical background of this phenomena nor the theory of Cauchy functional. We only want to outline against this background following (from the mathematics' didactic point of view very procreative) attribute: That newly acquired knowledge (i.e. active general linear function understanding) strengthens insight into traditional notions like the continuity of a function in a point, the continuity of a function on a set, the limit of a function, the monotony of a function, etc. From the pedagogy-psychological point of view there is the most important investigation and the consecutive solution of a reality here, namely that the question of existence of a discontinuous additive function cannot be resolved without the use of the Axiom of Choice. The mathematics teacher should proceed very carefully and reasonably here. Among others he has to convince his students that every problem in mathematics is at least desirable to solve even at the cost of additional premises. An answer like "It depends on an axiomatic system." is unacceptable. Obviously we cannot simply say that if we insert the Axiom of Choice to this system too, the discontinuous additive function will exist. Student's response could be: "I need no Axiom of Choice and therefore the discontinuous additive function does not exist for me." Fortunately (in this case) our hypothetical student virtually helped us with these contents. Namely if we do not accept the Axiom of Choice, we cannot assert that the additive discontinuous function exists, but also it does not exist! Again we appeal to a teacher's effort of the well-considered approach to similar situations. Because further his students will proceed in the "unconstructive mathematics". They cannot issue from any geometrical notions and that is why they will not be sure of their intuitive judgments. The training of proofs' techniques on theo-

rems which are intuitively obvious, is boring and from students' point of view useless. These theorems are quite different – here students are really motivated for this not in favour activity. Here they both prove "their proposition" and they are not sure of its acceptance at all. Students can indeed notify here that it is not possible to construct mathematics on the basis of intuitive notions. Here students can appreciate at all, that a basic implement for an acquirement of knowledge in the mathematics is the language of mathematics and that this implement is so much preferred, that any knowledge obtained in another way is considered the mathematical knowledge, only when it is proved by means of the mathematical language. Obviously the contribution of this matter is great to all intents and purposes – owing to the Axiom of Choice, which is used in it. Now it already depends on a teacher which next consequences of this one of the most important axioms he will go into with students. Here we only refer to the fact that without the Axiom of Choice we would not prove the proposition:

The function f: $\mathbf{R} \to \mathbf{R}$ is continuous in the point x_0 if and only if the following condition is satisfied for each sequence of real numbers x_n:

$$\lim_{n\to\infty} x_n = x_0 \Rightarrow \lim_{n\to\infty} f(x_n) = f(x_0).$$

There is no need to emphasize here how valuable from the didactic point of view is to find the moment in the proof of this known proposition, when the Axiom of Choice is used. Let us note here yet, that even the proof is mentioned in each textbook of mathematical analysis, the reality, that the Axiom of Choice is used in this proof, is not mentioned explicitly almost anywhere. To totalize, students thanks to our approach learn why we investigate e.g. additive functions. Not because they would be attractive for us themselves. But to find the weakest conditions, whose completion will guarantee, that we will be able to avoid them...

Now let us mention two applications of additive function yet, which certainly will extend a mathematical reach of our students.

First is the question of an axiomatic approach to the area of a rectangle Let us indicate $F(x, y)$ the area of the rectangle with sides x and y.

Let us require the area should be defined for any sides, should be always positive and equalled to 1 for unitary sides and finally equalled to the sum of areas of two rectangles, whose the area is a disjoint union.

In this problem in fact we look for the function $F: \mathbf{R}^2_+ \to \mathbf{R}$, which satisfies the system of two functional equations

$$F(x_1 + x_2, y) = F(x_1, y) + F(x_2, y)$$
$$F(x, y_1 + y_2,) = F(x, y_1) + F(x, y_2)$$

where $x, x_1, x_2, y, y_1, y_2 \in \mathbf{R}_+$. Its solution is in form $F(x, y) = cxy$, from that we already get the known formula (the rectangle with sides 1 is to have the area 1)

$$F(x, y) = xy.$$

Second application. The very interesting example of using Cauchy functional equation was given by solving one of twenty-three Hilbert's problems. In the concrete, the 3rd Hilbert's problem, put forth by him at the Paris conference of the International Congress of Mathematicians in 1900:

Are two arbitrary polyhedra with the same volume equidecomposable?

The result for polygons is affirmative and was known for long time as the Bolyai–Gerwien theorem.

The answer on the 3rd Hilbert's problem was as follows:

The analogous theorem for polyhedra does not hold, since e.g. a regular tetrahedron and a cube of the same volume are not equidecomposable.

The problem was solved in such way, that is was proved by means of certain invariants, that a tetrahedron and a cube are not equivalent by dissection under any circumstances. In the proof the additive function $f: \mathbf{R} \to \mathbf{R}$ satisfying the conditions $f(1) = 0$ and $f(\alpha) = 1$, where α is an arbitrary fixed irrational number was used.

Immensely valuable thing appears from a didactical point of view here: The reality, that the invariants of the tetrahedron and the cube differs one from another, can be proved without former mentioned discontinuous additive function too – consequently without the Axiom of Choice. Thus the facts are demonstrated here, that although the constructive mathematics is very attractive from the aesthetical point of view (it namely recognizes only objects, which can be constructed explicitly), this one often complicates proofs of even simple propositions which are clear in classical (it means unconstructive) mathematics.

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Tomáš Zdráhal,
Departments of Mathematics of Faculties of Education,
Palacky University in Olomouc and J. E. Purkyne University in Usti n. L.,
Czech Republic
tomas.zdrahal@upol.cz

Vliv axiomu výběru na metodické materiály ve výuce matematiky
Tomáš Zdráhal

Abstrakt

Tento článek se zabývá jedním důsledkem axiomu výběru, který umožňuje pochopit, jak mužeme lépe porozumět tradičním matematickým pojmům. Je zde ukázáno, že vyšetřování jedné speciální funkce přináší didaktický a metodický materiál pro demonstraci moderní koncepce výuky matematiky na vysokých školách.

Klíčová slova

Homomorfismus, funkcionální rovnice, Cauchyova rovnice, axiom výběru, Hamelova báze, nespojitá aditivní funkce.

REVIEW OF A BOOK

DÍVKY AND GIRLS ACCORDING TO CZECH GIRLS' MAGAZINES (LANGUAGE, IDEOLOGY, AUDIENCE AND ITS ATTITUDE)

Kateřina Jechová

Abstract

This article treats of a new book which is named "Dívky a girls podle českých dívčích časopisů (jazyk, ideologie, publikum a jeho přístup)". This book got out in 2007 in the Bor publisher. The authoress of the book is a very famous expert in the topic of teenzine – namely K. Kadlecová. This paper introduces this new book to potential readers and first of all presents personal opinion of this publication.

Key words

Review, medial education, publication "Dívky a girls podle českých dívčích časopisů (jazyk, ideologie, publikum a jeho přístup)" K. Kadlecová (author of this book).

The book called "Dívky a girls podle českých dívčích časopisů (jazyk, ideologie, publikum a jeho přístup)", written by Kateřina Kadlecová (*1980), was published by Bor publisher in 2007. In fact this is the authoress's second book which deals with the topic of girls' magazines. The first one was a monograph published in 2006 and it is called "Ženské časopisy pro pokročilé (literární interpretace a kritická analýza diskurzu měsíčníku Marianne)".

The authoress of the book studied the Faculty of Arts, specialization in Czech language and literature, then as well journalism and medial studies at Faculty of Social Sciences at Charles University in Prague. Nowadays she is a postgraduate doctoral student of Medial studies at Charles University in Prague. She works as the official university quarterly editor of Charles University called FORUM. She is also a journalist who publishes mainly the culture--orientated articles.

The book Dívky a girls podle českých časopisů is a kind of a study which deals with a language and ideology of chosen girls' magazines, namely Bravo-*GIRL!, COSMOgirl!*, Dívka and Top dívky. The authoress describes a position of the mentioned magazines on medial market, analyses language and a typical

genre as e.g. photo-novel and others. Her linguistic analysis, which is the major part of this publication, is based on an empirical investigation. This research was done using questionnaire that were filled in by Czech and American respondents (girls) of the age from 11 to 23.

The attention is paid mainly to frequently used anglicisms, neologisms, slang and sociolects. There are a lot of practical examples. Kadlecová tries to find out the range of impact of the magazines for girls on their behaviour. She determines how much the magazines help consumer lifestyle. Czech magazines are compared to American magazines as Seventeen, Teen Vogue and others. The authoress finds even higher level of propagation in American magazines but on the other hand the attitude towards sex is more conservative there.

In the first part of the book Kadlecová describes the problems of magazines for girls. She pays attention to the history of these periodicals and describes her own experiences during two month residency at Princeton University where she studied communication strategies and manipulation techniques of American girls' magazines. At the beginning of the book she says that the girls' magazines are being underestimated: *"Many magazines for girls are greater than the public as well as readers are willing to accept."[1]*, and that these magazines represent a strong phenomenon of nowadays popular culture. She writes: *"the magazines in fact command girls how they should look, behave and integrate themselves into society"[2]*. These teenzines are a notional entrance into "femininity" for most of the girls. Although the readers of these magazines do not trust their quality, the questionnaires proved that a bit more than one half of Czech and American girls studying at university read them regularly. Therefore one of the questions in the questionnaires is "Why do you read girls' magazines?". The most frequent answers were: "I am interested in them. There is pretty good advice.", "They make me relaxed", "I am interested in fashion tips, hairstyle, photo-novels... " Kadlecová points out that the readers of these magazines create an individual subculture and community which has some factors in common as age, nationality, hobbies, relation to the language or gender. Due to this they realize their position in the social structure and try to succeed on the heterosexual "market" – to be as much attractive for the opposite gender as possible.

The other parts of the book are Topics and genres, Language and style, How the girls see it, the last part is attended to American girls' magazines. The

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[1] KADLECOVÁ, K. *Dívky a girls podle českých dívčích časopisů (jazyk, ideologie, publikum a jeho přístup)* .page 8.
[2] The same book. page. 8.

publication includes also a lot of "colourful" material – photos, illustration of magazine front-pages and extracts of typical genres. In the last part of this book we can find a supplement which sums up (mostly in a form of tables or graphs) the results of the empirical research.

At the end the authoress summarizes general characteristics of girls' magazines as well as their main purpose – to strengthen social bonds among recipients.

Kadlecová deals also with the topic of Medial education RVP ZV (Framework Educational Programme). She emphasizes it is important to teach children and teenagers how to understand the language of media, to teach them to keep a critical view on medial content as well as to discover their manipulative strategy as soon as possible.

The study "Dívky a girls podle českých dívčích časopisů (jazyk, ideologie, publikum a jeho přístup") is a suitable guidebook of girls' magazines and their questions. It introduces a typology, genres, ideology, language and style of magazines for girls. It deals with characteristic topics and typical manipulation techniques which are specific for this type of media. It focuses on a group of target recipients too. The book comes up with the new up-to-date data via realized research and connects girls' magazines with the topic of Medial education RVP ZV. Above all of this it gives teachers, parents and all other people, who are interested in the medial education, a manual and attractive approach to this topic.

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Mgr. Kateřina Jechová
Postgraduate doctoral student
Faculty of Education,
Palacký University, Olomouc
Žižkovo náměstí 5
771 40 Olomouc
E-mail: jechova.kacka@seznam.cz

A NEW LITERARY AID NOT ONLY FOR STUDENTS OR TEACHERS

Lukáš Holčák

In September 2007, she book stock was enriched with a new publication by Libri publisher. The book should be valued not only by students and teachers, but also by reader's public. We mean a *Dictionary of Children's Literature Authors, volume I*. This dictionary is the result of cooperation of a collective of authors. The collective is compounded mainly of university teachers and literary scientists from the Czech Republic and foreign countries as well. The mentioned publication was created under the direction of prof. Ivan Dorovský, DrSc. (Faculty of Education, Masaryk University, Brno) and docent PhDr. Vlasta Řeřichová, CSc. (Faculty of Education, Palacký University, Olomouc). The first volume consists of a review of chosen foreign writers, especially from Europe and the U.S.A. The authors suppose that in the future they will concentrate on writers of children's literature from the Czech Republic. The dictionary is available either as a book or in electronic form (CD).

The first part of the dictionary offers a brief outline of a developmental phase of particular national children's literature. It represents gradual changes in the main trait of production reflecting development of the society, attitude towards children and their needs. While reading, one can realize that the books firstly focusing only on religious, moral or didactic objectives have been gradually obtaining genre and thematic diversity.

The majority of the space of the lexicon is dedicated to single entries. These are not focused only on writers but they also provide additional information about literary genres (eg. fantasy), significant literary awards (eg. AA – Hans Christian Andersen Awards) or literary magazines (eg. Barnboken).

In the biographical section of each entry, we can find also correct pronunciation of a particular writer's surname. In the final part of the dictionary, also alphabetically arranged, there is a list of the pronunciation of difficultly articulable first names. This list was created as a reflection to the fact that a lot of names is pronounced incorrectly (eg. Tolkien [tolki:n]). Therefore, we consider the transcribed pronunciation as a very important act popularizing such a kind of publication. Besides the dates and the places of writers' birth (possibly their death), in each writer's profile there is a brief summary of their

(often eventful) lives. As well as this, we can even find out the circumstances of particular writings creation. Contents of the writings is included as well. Each entry is followed by bibliographical compilation of writers' work with Czech translation of the titles. The writings having been translated into Czech and Slovak are highlighted by italics. Information about theatre or film adaptations is included as well.

The lexicon gives us information not only about intentional literature (meant to be written especially for children) but also about writers originally producing books for adults (eg. J. Verne, J. Swift) that, through the time, became the field of interest of young readers as well.

Owing to attractive introductory texts and readably approached entries we can realize that even children's literature had different purposes, such as religious, ideological, then it was propaganda, it had to be morally unoffending, and politically correct. It was also subordinated to censorship. On the other hand, it destroyed taboo and overcame the borders of fantasy.

We believe that this dictionary will be valued not only by experts or students but also by library staff, cultural institutions and various kinds of teachers. It might be them who will introduce this unique dictionary to their students and will lead them to an idea how to use it properly. After all, they were meant to be the main readers.

Mgr. Lukáš HOLČÁK

CZECH READERS AND THEIR READING HABITS IN 2007

Vlasta Řeřichová

Trávníček, J. *Čteme? Obyvatelé České republiky a jejich vztah ke knize.* Brno: Host, 2008, 208 stran. ISBN 978-80-7294-270-1 (Host. Brno), ISBN 978-80-7050-554-0 (NK ČR. Praha)

Following several recent Czech and international surveys of Czech pupils' reading habits, the first representative survey focused on readers above 15 years of age took place in 2007. The survey was a joint project of the Institute for Czech Literature, the Academy of Sciences of the Czech Republic and the Czech National Library. The results of the projects have been put together and summarised by the literary scientist and university teacher Jiří Trávníček in the book *Čteme? Obyvatelé České republiky a jejich vztah ke knize* (Do We Read? Czech Citizens and Their Attitude to Books).

The survey focused on several basic issues, predominantly on the attitude of Czech readers to books and the factors influencing their "reading behaviour", i.e. reading, buying books and visits to public libraries. The survey also dealt with social and demographic factors influencing the attitude of Czech readers, and the dependence of reading on these variables (i.e. sex, age, education, population density and income). Taking into account the methodology of relevant surveys from abroad and experience from implemented local research, the survey focused on social and cultural trace, i.e. the signs left by reading and reading related activities allowing us to judge what and how much is read, as well as, what is borrowed and bought.

The total number of 1551 respondents participating in the project were divided into three groups. After further explanation and interpretation of statistical data, the readers were assessed according to social and historical experiences influencing their reading culture.

The author notes that the youngest generation of readers (15-35) developed its attitude toward books in entirely different circumstances. Their path to books has not been obstructed by ideological barriers as it was the case of the middle and older generations of readers; however at the same time, they have the least number of guidelines and value criteria helping them to recognize a good book.

J. Trávníček suggests that the school system has its share of responsibility for this situation. Not only has the system been losing its authority by giving up the strictly defined common educational aims which included compulsory reading, but also, by its inability to react in a sufficient degree to the reading interests of pupils. Although the overall attitude of the youngest generation to reading according to J. Trávníček exceeds the expectations of their parents and grandparents, it is very unsettling to find that 14 % of the Czechs from 15–24 years of age do not read a single book per year. When the oldest and youngest generation of readers are compared it becomes evident that books and reading have lost their status. The attitude of the young generation is more pragmatic. In contrast to the oldest generation, the young readers perceive the author as their partner or as somebody who competes for their leisure time, and they are very well aware of this.

The survey confirms an exceptionally close relation between reading and education and the fact that education plays a key role in differentiating between readers and non-readers – there are three times the number of non-readers among people without completed graduation examinations (29 %). Exceptionally interesting are the reasons the respondents gave for the absence of reading – 21 % said a lack of time, 17 % of non-readers said that reading is a boring activity, 13 % obtained necessary information from news media and 5 % of non-readers did not know what to read.

The survey shows as well, that 21 % of non-readers do not enjoy reading. This clearly indicates that the contemporary school has not yet been able to fulfil the goals of the education of readers declared in the curricula documents.

The survey unequivocally proves the instrumental role that family plays in reading habits. 49 % of the respondents answered that their home environment with people reading influenced them the most. J. Trávníček sums up that reading in the family represents a basic social and cultural pattern which, when well established, develops in further life cycle phases but is difficult to initiate if not developed.

The commentary on the school influence concludes that school can develop the social and cultural pattern inherited from the family, but it will hardly instil it if it has not been set. This is confirmed by another finding that only 12 % of readers have been influenced by an inspirational teacher.

Of special interest are the answers volunteered by the respondents beyond the set questions. They described the circumstances creating their barriers to books (namely cost, organisation of public libraries, health, a lack of time),

their specific reading interests or their general lack of interest in reading. Their answers show that weak reader's reading habits are poor because there is no personal (internal) motivation. In other words, a weak reader reads because he is forced to (for professional or study reasons) and a strong reader reads because he wants to. External reasons like study or work may bind them to books, but when the internal reasons are absent, reading does not develop; and when external reasons have ceased to exist, reading often ebbs away.

The findings confirming motivation as an important presupposition of reading development should be of foremost importance in all considerations concerning optimal school education in reading.

The individual chapters clarifying the selected methodology and terminology, the commentaries on the data and their interpretation within a wider context provide a logically structured scientific text linking literary and scientific, as well as, sociological and librarian viewpoints. The book reads very well, transforming the report on the survey into a unique, exceptionally absorbing almost adventure literature about the state of Czech literacy and book culture.

This publication is designed for all those who, for professional or private reasons, are interested in reading and the culture of reading in Czech society. However, it should be analysed in detail by teachers and the students of the teaching profession for a number of inspirational stimuli concerning the education of readers at primary school.

Doc. PhDr. Vlasta Řeřichová, CSc.
Department of the Czech Language and Literature
Faculty of Education, Palacký University, Olomouc
Žižkovo nám. 5
771 40 Olomouc
vlasta.rerichova@upol.cz

BOOK OF INSPIRATION FOR FUTURE TEACHERS OF THE CZECH LANGUAGE

Eva Stránská

Pastyřík, S. *Inspiromat pro budoucí učitele českého jazyka*. Hradec Králové: Gaudeamus, 2008, 212 stran. ISBN 978-80-7041-982-3

This learning text is practically-oriented and draws on the author's experience of many years. Despite it stating, at the beginning of the book, *"It is not the aim of this book to offer theory at all..."*, we can refute that in some detail. The author is not only a great practician but he is also an expert in the field of scientific literature, including scientific papers, to which he makes reference at the end of each chapter. The readers consider the oral exercises and proper quotations not only a great source of motivation but also a personal introduction to the scientific problems.

The second part of the book offers often debatable and often neglected areas of the mother tongue to the readers. For example, there are proper suggestions and themes for written and oral communication: an emphasis on invention, composition and stylization; importance of subtitles and attention to essays and an essay-evaluation. There are also the examples of referencing and citing quotations in a correct form. The author also deals, very usefully, with synopsis forming. (Currently, pupils and students usually write the synopsis after finishing their essays.)

The analysis of individual stylistic units makes use of actual examples of pupils' work. We would like to mention that there are several approaches to writing a structured *curriculum vitae* (each company compiles its own synopsis with requests for information which must be included).

We agree with the author's opinion that key words, annotation, resumé etc. present great difficulties for many students. Authors of research papers, diploma-, masters-, or doctoral thesis are often puzzled. When college tutors or graduates use a dataprojector for their presentation, they often need proper advice to prepare a good presentation (a pithy text becomes illegible at the back of a lecture-room, improper choice of colours contributes to bad-arranged presentation, too).

Mr. Svatopluk Pastyřík, the college lecturer, presents a well-structured text, even in a graphic way, with some far-reaching insights to the didactic problems. The author draws upon students' examples – kept in the original form (grammatical or stylistic mistakes are not corrected because the author's aim was to encourage the readers' thinking and evaluation of the text).

The book is a very useful and valuable teaching aid for current and future teachers of the Czech language. As the author says,: *"I wish the book to be an effectual and actual teaching aid for teachers of Czech."* We are sure this wish will be fulfilled.

In Olomouc November 5, 2008

Mgr. Eva Stránská
Department of the Czech Language and Literature
Faculty of Education, Palacký University, Olomouc
Žižkovo nám. 5
771 40 Olomouc

CURRENT SLOVAK LITERATURE FOR CHILDREN AND TEENAGERS

Dagmar Tučková

URBANOVÁ, S. – STANISLAVOVÁ, Z. *Current Slovak Literature for Children and Teenagers.* 1. vyd. Ostrava: Ostravská univerzita v Ostravě, Filosofická fakulta, 2006. 260 s. ISBN 80-7368-206-0

Svatava Urbanová is one of the literary scientists who are interested in the literature for children and teenagers. She and Zuzana Stanislavová wrote a book *Současná slovenská literatura pro děti a mládež,* which was printed in 2006 in Ostrava. This book's subtitle is Antology. But it is not only about antology. It is an overview of Slovak literature for children and teenagers.

This book begins with a preface written by Svatava Urbanová. In this preface there are discribed current tendencies in Slovak literature for children and teenagers, developing trends and comparison of the Czech and Slovak literature.

After Urbanová's preface follows essay by Zuzana Stanislavová. In this essay she maps out the situation in Slovak children's literature after 1990. She points out political changes after collapse of the communist regime and lack of the experts on the field of literary critic. This caused intersection of brack and trivial work on the market of children and teenager's literature, following stagnancy during the 1990s and a break through in this situation by new artists' works at the beginning of the 21st century.

Each section of the book begins by expert academic studies, which apply to the next exemplifications created by Slovak literaties. These papers are written by prominent Slovak experts who are orientated in this field of literature (e.g. Brigita Šimonová, Jana Nemcová, Eva Vitézová, Zuzana Stanislavová, Milan Jurčo, Ján Kopál etc.). The book ends with an essay from Viera Šemberová who described the development of literary criticism within last ten years.

Chapters are devided into sections according to literary structure.

First chapture, which is called Myths, fables, legends, fairy tales and fames is preceded by Eva Vitézova's essay. She explains the main features of myths, fables, legends, fairy tales and fames, their origin, development, structure and reasons why this type of narratives came into being. The authors chose samples

from Mária Ďuričková, Ondrej Sliacky, Milan Ferko, Anton Marec and Elena Lacková.

Poetry is the subject of the second chapture. The introduction is written by Ján Kopál. The key word of this part is rhyme. Kopál distinguishes the so--called coltish composition of the rhyme and rhyme of nonsense. His theory is completed with examples of Slovak poets. Presented verses are by Ľubomír Feldek, Miroslav Válek, Milan Rúfus, Daniel Hevier, Daniela Hivešová-Šilanová and others.

The third chapter deals with the authorial fairy tale. Brigita Šimonová wrote preface for this section. She points out the imagination in literature for children and teenagers and time as one of the important elements in authorial fairy tale because of a main hero's movement. The second major element is the change-over of real and fantastic worlds, characters and nonsenses. As authors of authorial fairy tales, Ján Milčák, Ľubomír Feldek, Vincent Šikula, Ján Uličiansky, Daniel Hevier, Július Satinský and others are mentioned.

Social prose – in Czech literature it means story with a child hero and his life. The chapter about social prose is executed by a co-author of the book – Zuzana Stanislavová. She tries to explain this term "mimezis", which is determining for understanding of basic features in Slovak social prose. "Mimezis" is an epical model of the actual world, which is in relation with the world, standing out of reach of literature. Social prose comprices stylish varieties, reflects all levels of literary work. It gets acquainted with basic models of human relations – stories could be real or unreal, could be in correlation with the children and adult's world. As a literary formation social prose is usually represented by amusing, fairy or adventurous stories. The most important aspect are talent and the author's creative invention.

The fifth part of the book with the preface is called adventurous literature which is interesting especially for boy-readers. Among a literary figures we can range historical-adventurous stories, westerns, crimes etc. The base of these stories is an exciting, thrilling action, adventure and admirable hero. Alta Vášová, Peter Stoličný and Jela Mlčochová are writers of adventurous literature who are mentioned in the book of *Súčasná slovenská literatura pro děti a mládež*.

Nonfiction literature is the sixth and penultimate chapter with symplex of this book. Milan Ďurčo who is an autor of the openning part of this section writes at the beginning about non-existence of nonfiction literature without ideological influence before 1989. After this year nonfiction literature started its development. Ďurčo accentuates a genesis of nonfiction literature from re-

lation of facts to the fiction. Among authors of this type of literature belongs for example Vojtech Zamarovský, Nataša Tanská, Kveta Dašková, Jaroslava Blažková or Vladimír Ferko.

The last chapture written by Marta Žilková is focused on drama; it solves the question of influence and changes in drama in last ten years. Drama moved from literature to massmedia and modern name of this phenomen is the media culture. But the debatable problem is an artistic descent, because today's drama is more focused on the accepter's interest (it means living questions or the actual politic sphere). One of the most popular phenomena of these days are reality shows on TV. Drama has its own specific language and speech. Changes in the medial sphere are based on manipulation with the recipients. As the exemplifications they were used in extracts of Ján Uličiansky, Vlado Bednár and Daniel Hever.

The book *Současná slovenská literatura pro děti a mládež* is finished by a scientific essay written by Viera Žemberová and completed by two annexes from the authors Viliam Klimáček (picture from his book Noha k noze) and Dušan Tarangel (picture from his book Rozprávky pre neposlušné deti a ich starostlivých rodičov).

In the end of the book there is a dictionary of authors whose samples are used in this book. This fact makes the book of Svatava Urbanová more similar to a copybook or schoolbook.

In my opinion this book is a usefull contraption for learning more about Slovak authors. At many high schools or universities students are not accustomed to reading anything written by Slovak writers. *Současná slovenská literatura pro děti a mládež* is a synoptical publication not only for Czech students. The samples used in this book are collected from works of famous Slovak authors and they can be branded like the "best" from the current Slovak production in all the literary spheres after 1990.

Mgr. Dagmar Tučková
Department of the Czech Language and Literature
Faculty of Education, Palacký University, Olomouc

LEARN TO THINK CREATIVELY

Tomáš Macoun

Naučte se myslet kreativně, Author: Matthias Nöllke, Published by: Grada Publishing, a.s., Year of publication: 2006, ISBN: 80-247-1519-8

Is it possible to learn how to be creative? Can we really become more creative by training and learning it? Of course not, some could argue. However, good ideas often bring unexpectedly good results! Myths about creativity are enormous. Geniality and madness, sense and nonsense, delusion and fraud – these are the most common characteristics of people seeking an idea, a great idea may be. Creative people are often more flexible and purposeful than one could possibly imagine.

Matthias Nöllke, the author of a book called "Learn to think creatively", which was published in 2006 by Grada Publishing, is trying to get to the bone of it. And the result? Creative nature of a human being and the flow of inspiration often lead to a long lasting working process: the more you work, the more creative you become. The author also claims, for instance, that creativity and economic success are not necessarily in conflict with each other. Let's take a look at some interesting ideas arising from having read this book.

In chapter one, the author is trying to look at creative personalities from different perspectives; he describes divergent and lateral thinking and deals with the five most frequent misinterpretations related to the idea of creativity, such as social perception of creative people being "outsiders". The contrary is the case, the author says.

Furthermore, throughout the second chapter, we get a change to discover the eleven biggest "creativity killers" together with five steps of a creative process – from designating the target to the final solution. An outline of a creative personality and the difference between a monotonous routine and creativity are also included, as well as the revelation of so called "wild thinking".

According to the author, "The thought is good only when it is accurately evaluated." Nöllke sets out a list of creative techniques using terminology (mainly in chapter three). The majority of the educated public is somehow aware of how a brainstorming session or a mind map work**,** but concepts like

random-input, morphological containers and other matrixes, mental provoca-
tion and progressive abstraction are encountered by a common user very rarely.
Author's suggestions are frequently quite abstract, yet there is always some kind
of gist behind them. In addition, we are able to compare their advantages and
disadvantages together with the situations in which these ideas can be used.

In the last chapter an emphasis is put on the importance of creative seminars
for business people as well as it is insisted on implementing creative communica-
tion into working process within companies and other organizations. A require-
ment of innovative and cooperative culture is also considered important. The
fact that there is a number of useful tips and examples throughout the book can
become especially handy for people working in managerial positions, creative
personnel, lecturers or simply for those who use creative thinkng on an daily
basis. As one of the results, it may help them strengthen their own competitive-
ness on the market or improve the creativity amongst others in the work place.

Nölke never calls creativity a fancy 'accessory' of a few involved. In the
contrary, creativity and the use of related techniques, which are demanding
and elaborative, are crucial for people who want to progress with their careers.

It is not necessary for the author to convince us very much about the impor-
tance of this topic. He simply lets us know that a creative solution has to free
itself from a tedious routine. Once this is achieved a success can be guaranteed.

Useful tips, impressive examples and nice old-fashioned burlesques used in
the book contrast with the prosaic text, which – even though quite short – does
not lose its grace. Although the text is mainly aimed at beginners being a short
introduction to creativity, more advanced readers will be able to discover some
new exciting and inspiring pieces of information.

Dr. Matthias Nöllke is also the author of several publications, such as *"Deci-
sion Making"* – an effective and correct decision making at work and in a private
life; *"The Art of Verbal Self-defence"* – accurate, prompt and humorous reactions
to verbal attacks and provocation; *"Practical Management"* – what managers
need to know in order to successfully manage themselves, other people, teams
and the whole companies.

To put it in a nutshell, *"Learn to think creatively"* will definitely provide you
with a quick, competent, compact and an easily understandable answer to how
to be creative.

Mgr. Tomáš Macoun
Department of the Czech Language and Literature
Faculty of Education, Palacký University, Olomouc

Summary

The magazine e-Pedagogium is an independent professional magazine. It is meant for the pedagogical employees of schools of all types. Its content focuses on the presentation of research information, theoretical studies and expert essays pertaining to the issue of schooling and education, with particular emphasis on the diverse fields of pedagogy, special education, pedagogical psychology and field didactics of general education subjects.

Anotace

Časopis e-Pedagogium je nezávislý odborný časopis. Je určen pedagogickým pracovníkům všech typů škol. Svým obsahem je zaměřen na prezentaci výzkumných sdělení, teoretických studií a odborných prací, vztahujících se k problematice vzdělávání a školství, zejména pak z oblasti pedagogiky, speciální pedagogiky, pedagogické psychologie a oborových didaktik všeobecně vzdělávacích předmětů.

Zaměření:
15. Pedagogika

Klíčová slova:
Pedagogika, vzdělávání