



## Slovak high school students' attitudes to ICT using in biology lesson

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### 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 gender and age 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. Students attended the all of grades (first, second, third and fourth). They were 15- to 19-years old. Data were evaluated with factor analysis and the ANOVA. 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 and the younger students had more positive attitudes toward information and communication technologies using in biology lesson in comparison with the older students.

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### 1. 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. Students have used the discussion sites to share data, collaborate on assignments, etc (Brewer, 2003). Osborne and Hennessy (2001) reported that ICT enhances the effectiveness of information presentation and also stimulates students' interest. Moreover, Selinger (2004) claimed that ICT can improve the quality of education because multimedia content helps to illustrate and explain difficult concepts in ways that were previously inaccessible through traditional teaching resources and methodologies. Similarly, Ferrer (2002) reported that the use of multimedia approach such as interactive CD ROM, PowerPoint presentation and graphing software had been successful in generating conceptual understanding in students. The potential benefits of using ICT in teaching and learning are immense. The use of ICT has greatly transformed the outcomes of teaching and learning experience in classrooms. It does not only supplement and/or complement teacher instructional processes but also offers unlimited access to knowledge and information that is readily available through the internet. Another benefit is that teachers who use

computers in teaching were found to increase their confidence level in teaching (Gilmore, 1995). Yu (1998) used a computer assisted instruction and found that it increased students' performance and attitudes towards science.

We can assume that ICT increases student motivation, what is seen in many arguments for why ICT should be used in schools. There are a lot of assumptions that students are interested in using ICT; they found it more pleasant, more appealing, and more motivating to study with computers than with traditional means. But we always keep in mind, that ICT is just one component of the teaching process, but it is particularly important because of the special features brought to the learning and application of other subjects in the school curriculum, such as: speed, capacity and range of access to information; automatic processing of data; ease of amendment of work carried out; immediate feedback to the learner (Kennewell, 2001).

Cooper and Brna (2002) reported evidence that pleasure and variety kept students engaged and motivated. Further, since students worked happily and would less easily lose motivation, the teacher had more time to help individuals. Cooper and Brna made conclusion that if ICT is carefully planned and pedagogically implemented, it can support relationships and motivation that in turn support long-lasting engagement and learning. McKinnon, Nolan, and Sinclair (2000) found that students in their experimental group became enthusiastic computer users and performed significantly better compared to the ones in the non-experimental group. However, during the 3 years time, their attitudes towards computers became significantly less positive, which is caused by computers becoming such a routine part of the studying (like pens, for

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example) that they lose their halo effect. The authors suggested that ICT can be compelling, but only quality of curriculum programs in which the technology is implemented makes the real difference between students' attitudes, motivation, and performance.

The everyday encountering and using of ICT has entail an influence on an interaction between humans and computers. The successful integration of computers in educational environments depends, to a great extent, on teachers' and students' attitudes towards them (Selwyn, 1999). The attitude is defined as a positive or negative sentiment, or mental state, that is learned and organized through experience and that exercises a discrete influence on the affective and conative responses of an individual toward some other individual, object or event (Ajzen & Fishbein, 1980). The earliest research that examined attitudes toward computers was conducted by Lee (1970). He identified two dimensions of attitude: (1) the beliefs in the computer as a beneficial tool and (2) beliefs that the computers are autonomous entities.

Computer or ICT attitude has been 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). Winter, Chudoba, and Gutek (1998) found a correlation between attitude toward technology and number of hours spent using a computer. Winfred (1991) quotes in his study that initial computer experiences may play role in the formation of computer attitude.

Dorup (2004), in a study of undergraduate medical students in Denmark, found that most students had access to computers at home as well as used email and the internet regularly. In addition, 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. Finally, there were favorable attitudes toward the use of ICT as a supplement, as opposed as to use ICT or distance education as a replacement to traditional teaching activities.

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 & McGabe, 1984).

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. Several studies found gender differences in attitudes toward ICT. Brosnan (1998) showed that 6- to 11-year-old boys had more positive attitudes towards computers than girls. Graff (2003) found that girls were less likely to use computers and were less confident in using ICT than boys. Pupils' attitudes towards computer exercises were highly positive (Ogilvie, Trusk, & Blue, 1999) and, additionally, most of students could work their own speed and their computer literacy will improve. The current study of Palaigeorgiou, Siozos, Konstantakis, and Tsoukalas (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 posi-

tively the consequences of computers in personal and social life. Fančovičová and Prokop (2008) found out no differences between gender in attitudes toward ICT. The similar results are possible to find in other studies (Mizrachi & Shoham, 2004; Teo, 2006). Sha-shaani (1997) found out, that boys are more interested in working with computers than girls. Boys have better ICT and computer skills, they use computers more in their leisure time, and their attitudes toward computers are more positive than the attitudes of girls. They use computers more for playing and recreational purposes, they are more interested in hardware, and they take on more independent challenges for learning computers and ICT than girls do (Hakkarainen et al., 2000; Papastergiou & Solomonidou, 2005). All over world there is a trend, technology has a special connection with boys and males. The culture of technological knowledge is a set of socially constituted practices, and these practices have encouraged boys and men, more than girls and women (Clegg, 2001; Facer, Sutherland, Furlong, & Furlong, 2001). Only few works reported that women have a positive attitude toward ICT. Ray, Sormunen, and Harris (1999) found out that females are more positive about computers than males. Women asserted, ICT simplify tasks and increase productivity. ICT also presents evidence to support the belief that women have become more comfortable with technology, removing a stumbling block to opportunities related to technology.

There is a lack of publications, where are presented the results about attitudes toward ICT among age of students. Younger pupils, boys and girls have more positive attitudes toward computers than the older (Comber, Colley, Hargreaves, & Dorn, 1997; Laguna & Babcock, 1997). But, there are many studies, where it is reported, that older students have more positive attitudes to computers than the younger (Bozionelos, 2001).

The use of ICT in classrooms may change a behavior of students. Eadie (2001) quotes in study following: the development of various intellectual for example reasoning and problem solving, learning how to learn and creativity; specificity of what is learned using the new technologies is broadened and deepened; students demonstrate a greater spontaneous interest in a learning activity; the time and attention devoted to learning activities increases when students use ICT; the ease of access to information sources develops the research spirit; broader co-operation among individuals within and beyond school is enabled through technologies; the availability of simulation, virtual manipulation, graphic representation and rapid merging of data contributes to linkage in knowledge and leads to more integrated and better-assimilated learning; teachers gain information on new instructional resources and availability of support for their use much more readily with ICT; teacher co-operation with others both within and beyond the school when planning activities; the orientation of planning is more towards students performing real work in co-operation with other students; relationships between teachers and students more interactive and guiding, rather than transferring information from teacher to student; a different vision of teaching and learning; learning seen more as continuous research than a body of fact; assessment of learning uses more demanding methods; more effective diagnosing of specific difficulties.

## 2. Methods

### 2.1. Purpose of study

Slovakia is a part of the developing countries in the using of computers and ICT in the learning and teaching process. There are a lot of enthusiastic people but also critics on the other hand of using computers in schools – elementary and high school. In the last few years, we can observe a great effort of some institutions and people with the help of government, regarding the intro-

duction of ICT into learning process. In Slovakia there is a lack of articles, which concern of students' investigation attitudes toward ICT, using of ICT. The amount of computers in Slovakian schools rapidly increased. ICT are not used only in lessons of informatics, how it was the only way recently, but during all subjects. The creation of students' attitudes toward this equipment is connected with the process of the ICT installation in schools.

The purpose of this study is to contribute to a better understanding of the current status of boys and girls attitudes toward ICT using in biology lesson and also to augment a supply of publications, which are relating to investigating of attitudes toward ICT in the dependence on age of students. Other aim was to find out students' attitudes toward using of ICT in biology subject. Whether there is a sufficient positive influence of ICT on biology teaching or not.

Our study aims to answer the following questions:

- (1) What are students' attitudes toward ICT using in biology lesson?
- (2) Was there any difference between girls and boys in the attitudes toward using ICT in biology lesson?
- (3) Was there any difference between age of students in the attitudes toward using ICT in biology lesson?

These hypotheses were evaluated:

- (1) Boys have more positive attitudes toward ICT than girls.
- (2) Older students have more positive attitudes toward ICT than younger students.

## 2.2. Instrument

In this study, there was used questionnaire (ICT Attitudes Questionnaire – IAQ) of authors' own construction. The questionnaire was anonymous and it was divided into two sections. In the first section there was introductory text, following demographic variables namely, gender, age and the year of study. The second section consisted of 33 items, focused on students' views on ICT. All schools, where the questionnaire was distributed have a sufficient equipment of ICT technique. So, we did not ask students on access to computers. There was a precondition of all students' access to computers and internet. The items of questionnaire were oriented only on ICT activities connected with school environment. So, there was not a reason to quote question concerning to ICT owning. Every item in the questionnaire is 5-scale by Likert (1932). Likert scale question comprised five points ranking following: “strongly agree” (5 points), “slightly agree” (4 points), “neutral” (3 points), “slightly disagree” (2 points), “strongly disagree” (1 point). Several questions were constructed negatively. The evaluation of them was in reverse order. From all items there were 16 constructed positively and 17 negatively. A reliability of questionnaire was found out after collecting of filled questionnaires. The value of Cronbach's alpha ( $\alpha = 0.82$ ) have indicated a high internal consistence of questionnaire. The factor analysis was used for statistical evaluation and we found out 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 five items which factor score was smaller than 0.3 (Anastasi, 1996). In the next evaluation we used analysis of variance (ANOVA). We tried to find out whether there are some statistically significant differences between gender and year of study.

## 2.3. Participants

The sample consists of 518 students from 9 Slovak high schools. The schools were chosen according to the classic style of teaching

in the Slovak proportion. We chose schools, where, according to government, computers as a learning and teaching component. Conventional length of study in Slovak high school is 4 years. We obtained results from every year of study. We obtained results from 145 (27.99%) students in the first year of study, from 126 (24.32%) students in the second year of study, 187 (36.10%) students in the third year of study and from 60 (11.58%) students in the fourth year of study, whose completed the questionnaire. The age of students was between 15 and 19 years. The average age was 16.97 ( $n = 518$ ;  $SD = 1.00$ ). In whole sample there were 322 (62.16%) girls. Respondents filled the questionnaire during 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 min.

## 3. Results

As we reported overhead, we found out a high value of the questionnaire reliability ( $\alpha = 0.82$ ). The factor analysis has been used on obtained results. We found out five dimensions, names of dimensions are shown in Table 1, together with values of Cronbach's alpha of each dimension. In Table 1, there are shown factor analysis values, too. We deleted five items from other analyzing; because value of factor score was lower than 0.30.

We used Pearson correlation (Pearson's product moment), if there is a relationship between dimensions. The values of correlation are shown in Table 2. We can see that there is no high correlation between dimensions. The highest value of correlation is between factor 3 (advantages of ICT) and factor 4 (ICT usage in biology lesson). These two dimensions correlate on the medium level.

We found out statistical significant difference in the results between gender ( $F(1,516) = 4.48$ ;  $p < .05$ ). 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.

We found out statistical significant difference in the results between classes ( $F(3,514) = 2.72$ ;  $p < .05$ ). Fishers' LSD posttest showed statistical significant difference between first year students and fourth year students ( $P = 3.68$ ,  $p < .05$ ). Students of first year study achieved average score 3.68 ( $n = 145$ ;  $SD = 0.03$ ) and students of fourth year study achieved average score 3.55 ( $n = 60$ ;  $SD = 0.05$ ). Similarly, Fishers' LSD posttest showed statistical significant difference between second year study students and fourth year study students again ( $P = 3.69$ ;  $p < .05$ ). Students of second year study achieved average score 3.69 ( $n = 126$ ;  $SD = 0.04$ ). Third year study students achieved average score 3.60 ( $n = 187$ ;  $SD = 0.03$ ). It means that younger students, in this case first and second year students, have more positive attitudes to ICT than older students.

By the investigation of dimensions, we found out statistical significant difference in the results by the evaluation of gender and class. In Table 3, there are shown values of ANOVA for variables by each dimension.

In Table 3, we can see that statistical significant difference in the results between genders was founded in the all dimension except of dimension called “Advantages of ICT”. In the first dimension was statistical significant difference in the account of girls, but in other dimensions (the negative influence of ICT, ICT usage in biology lesson and disadvantages of ICT) it was in the account of boys. The highest difference was in the second dimension, where boys achieved average score 3.63 and girls 3.15. Statistical significant difference between classes was found only in two dimensions (advantages and disadvantages of ICT). The highest score (3.94) in the dimension “Advantages of ICT” achieved second year study students. The lowest (3.71) achieved first year study students. By

**Table 1**  
The factor analysis score of IAQ.

	$\alpha$	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
(I) <i>The positive influence of ICT</i>	0.76					
(1) ICT are important in the biology teaching		<b>0.67</b>	-0.11	0.03	0.02	0.00
(2) ICT make lesson more interesting		<b>0.73</b>	-0.06	-0.03	0.02	0.03
(3) The ICT usage causes a higher interest in biology		<b>0.79</b>	0.03	0.08	0.01	0.04
(4) I understand in biology curriculum more, when the ICT are used		<b>0.76</b>	-0.04	0.11	0.07	0.09
(5) I have got ideas, when the ICT are used		<b>0.59</b>	0.17	0.05	0.17	-0.06
(7) ICT cause exhaustingly to me		<b>0.47</b>	0.21	-0.07	0.21	0.24
(9) The work with educational disc make a cognitive process better		<b>0.48</b>	-0.13	0.27	0.22	-0.06
(19) I am bored on biology lessons, when ICT are used		<b>0.44</b>	0.10	0.17	0.18	0.28
(20) I do my homework quicker, when I use ICT		<b>0.40</b>	0.02	0.20	0.22	0.19
(II) <i>The negative influence of ICT</i>	0.67					
(22) The ownership of PC is useless, because PC makes learning impossible		0.10	<b>0.32</b>	0.23	0.10	-0.11
(23) The using of computers causes eyes disease		-0.09	<b>0.74</b>	0.01	-0.04	0.12
(24) It is impossible to meaningfully use ICT, because a majority of information is in other language than Slovak		0.07	<b>0.41</b>	0.00	-0.08	0.15
(25) The using of ICT causes a spine disease		-0.01	<b>0.77</b>	-0.04	0.18	0.11
(28) ICT do not save energy		0.00	<b>0.59</b>	0.11	-0.12	0.03
(29) The computer is not suitable tool for teaching, because it needs a lot of space		0.20	<b>0.35</b>	0.19	0.06	0.16
(III) <i>Advantages of ICT</i>	0.64					
(26) E-mail helps me to find out of information		0.09	0.04	<b>0.48</b>	0.20	-0.19
(30) The advantage of ICT is that classes are less dusty in comparison with using of chalk and blackboard		0.04	-0.07	<b>0.57</b>	0.15	0.12
(31) ICT save a space, because teacher does not need teaching aids		0.12	0.08	<b>0.78</b>	-0.12	0.19
(33) I obtain more information from internet than from textbooks		0.10	0.10	<b>0.55</b>	0.14	0.05
(IV) <i>ICT usage in biology lesson</i>	0.41					
(6) I give priority to a computer before overhead projector		0.00	0.15	0.25	<b>0.36</b>	0.29
(10) I consider the work with internet for unimportant on teaching process		0.12	0.03	-0.03	<b>0.62</b>	0.17
(13) We obtain new information by the using web pages, because some information in textbooks have become outdated		0.21	-0.04	0.21	<b>0.63</b>	0.03
(14) I have got an opportunity to cooperate with other schools with the assistance of ICT		0.13	-0.04	0.14	<b>0.61</b>	-0.06
(V) <i>Disadvantages of ICT</i>	0.40					
(8) I am not able to concentrate on teaching process, when the computer is turned on		0.16	0.20	0.09	0.10	<b>0.34</b>
(11) Biology teachers should examine only by the ICT assistance		0.10	0.21	0.26	0.24	<b>0.38</b>
(12) I think that I achieve worse evaluation by the written examining with the ICT assistance		0.07	0.06	-0.05	0.11	<b>0.30</b>
(15) I am not able to concentrate on teaching process, when the camera is using on teaching process		-0.05	0.07	0.02	0.05	<b>0.70</b>
(16) My communication with teacher is worse, when the ICT is used on teaching process		0.19	0.14	0.15	-0.05	<b>0.68</b>
<i>Deleted items</i>						
(17) I am not satisfied with ICT using on biology lessons at our school		0.07	-0.03	0.07	0.02	0.08
(18) The ICT equipment of our school is very poor		-0.06	0.01	-0.09	0.01	-0.12
(21) I use ICT on the paper preparation		0.10	-0.05	0.03	0.06	0.03
(27) Teachers should be more trained in the using of ICT		-0.02	0.04	0.24	0.12	-0.01
(32) I have got a fear, when I used a computer		-0.01	-0.05	0.23	0.11	0.02

$\alpha$  – Cronbach's alpha. The numbers of items are identical with number in questionnaire.

**Table 2**  
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

**Table 3**  
Values of ANOVA for each dimension and variables (statistical significant differences are visible by bold).

	Gender ( $F(1,516)$ )	$p$	Class ( $F(3,514)$ )	$p$	Average score	Standard deviation
The positive influence of ICT	7.31	<b>.007</b>	1.42	.24	3.55	0.78
The negative influence of ICT	47.92	<b>0</b>	0.62	.60	3.33	0.82
Advantages of ICT	0.73	.39	2.94	<b>.03</b>	3.78	0.74
ICT using in biology subject	15.93	<b>0</b>	12.41	.07	3.91	0.67
Disadvantages of ICT	4.76	<b>.03</b>	11.30	<b>0</b>	3.41	0.62

the using of Fisher's LSD posttest we found out that there were statistical significant difference between first year and second year study ( $P = 3.71$ ;  $p < .05$ ) and between third and second year study students ( $P = 3.72$ ;  $p < .05$ ). In the dimension disadvantages of ICT the highest score (4.02) achieved second year study students and the lowest (3.48) achieved fourth year study students. For the other statistical analysis we used Fisher LSD posttest and we found out statistical significant difference between first year study students and fourth year study students ( $P = 4.01$ ;  $p < .001$ ), between second year study students and fourth year study students ( $P = 4.03$ ;  $p < .001$ ) and between third year study students ( $P = 3.90$ ;  $p < .001$ ).

There are some examples for students' responses. In the question 2 about 82% of all students think that ICT make lessons more interesting in comparison with situation, when the ICT are not used on the lessons of biology. Approximately 3/4 of all students consider educational disc for a teaching aid, which can improve their cognitive process. Nearly the 85% of all respondents are able to concentrate on teaching process, when a computer is turned on. The noise of computer does not disturb these students. Only 13% of students consider internet for useless tool for teaching and finding information. More than 3/4 of respondents use internet for obtain-

ing new information. These students think that some information in textbooks could be outdated. Nearly the 85% of all students do not own a computer for use. They think that computers help learning and computers are very important teaching tool and they can improve teaching skills. Approximately a similar amount of students do not think that computers need a lot of space. They consider computers for a normal equipment of classes and computers are needed for a improving the learning process. The using of ICT makes classes less dusty, with this claiming agree near 75% of respondents. From deleted items interesting results were found in two items of questionnaire. Approximately 3/4 of all students use computers for paper preparation. There is possible that students only download papers and use it on biology lessons. Almost all students have not fear from the using of computers.

#### 4. Discussion

In our research we tried to investigate two research fields, first is the investigation of gender attitudes toward ICT usage in biology lesson and second investigation of attitudes toward ICT with respect to age of students. When we see close-up view, we can see that boys have more positive attitudes toward ICT and younger students (first and second year study students) have more positive attitudes toward ICT than older students (third and fourth year students). Fourth year students have more negative attitudes toward ICT in the comparison with younger students. We can accept first hypothesis, because boys have got more positive attitudes toward computers than girls, but the second hypothesis should be rejected, because older students have not got more positive attitudes than younger students. On statistic evaluation we used a factor analysis, an analysis of variance, and a 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 lesson; (5) disadvantages of ICT. When we are comparing gender differences in results, we can see that only in first dimension girls have got higher score than boys. In the comparison of classes, there was found out, that in the all dimension have the highest score second year study or first year study.

The similar result aimed on finding differences in results between genders in comparison with our study found out (Comber et al., 1997; Durndell & Thomson, 1997). There is normal thing, that public view consider boys and males for more technically competent like girls. The similar affirmation has got Cooper (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). But some studies reported no differences in attitudes in gender (Fančovičová & Prokop, 2008; Teo, 2006). There are few of empiric studies, which are aimed on age of students and attitudes toward ICT. Comber et al. (1997) found out that the youngest students have more positive attitudes to computers than the oldest ones.

There could be several reasons, why younger students have got more positive attitudes toward ICT. Younger students use computers in the majority of cases on the not-working activities. On the basic of this asserting, younger students do not see disadvantages, which are connected with the using of software and hardware. Older students use computers mostly on the working activities and they are nervous, when the work with computer application is not as expected.

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 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 use computers and they would like more use ICT in teaching. So from this results are followed that ICT making the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable among others.

#### 5. Conclusion

Attitudes results toward ICT using in biology subject among high school students were based on statistical evaluation – a factor analysis, an analysis of variance, a Pearson's correlation.

Using factor analysis we found out five dimensions/categories. Using of analysis of variance we found out some statistical significant differences between boys and girls and among classes, as well. Boys perceive ICT in biology more positive than girls and younger students reached higher score in attitudes toward ICT.

Students, whose were respondents of our investigation showed an interest about using ICT in the biology classes, it was obvious from their answers.

Teaching and learning of biology could be made more interesting if the lesson presentation using PowerPoint is supplemented with other activities to motivate students to learning and to make more interesting, to attract more students. Because students' interest in biology as subject decreases. There is much software (CD ROMs) available which can be provided to the students to allow them to engross the biology as subject, 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 best to influence the knowledge. The use of ICT will bring new, exciting, actual and rewarding educational experiences for both students and teachers. But, there is still a need to do research about using of ICT in biology, about attitudes of students to ICT, because we need to find a right level of using in lessons.

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