LITHUANIAN AND ESTONIAN STUDENTS' ATTITUDE TOWARDS SCIENCE TEACHING/LEARNING METHODS: COMPARATIVE ANALYSIS

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Abstract

A number of the latest investigations specify the necessity of improving science education at all levels of the education system. A decreasing interest in sciences is one of the most acute problems of present education. The purpose of this research is to analyse how students evaluate the current situation on using different teaching/learning methods and means in the process of science education. Research was carried out in Lithuania, Estonia and Latvia (Lamanauskas, Vilkonis, 2008). This article presents more exhaustive research results, which were obtained after carrying out comparative analysis between the respondents of two countries – Lithuania and Estonia. It is very important to compare the evaluation, attitudes of the students belonging to the same region country, because earlier carried out researches show that in spite of common natural science education tendencies, rather significant differences exist between countries. It is believable, that they are predetermined by various educational approaches, teachers' competence and other different reasons.
Key words: *science education, methods, learning process, ICT.*

Introduction

It is obvious that ICT is rapidly developing. Different technologies are being created. The implementation of new technologies in the educational process raises new possibilities for both teacher and learner, enhances education quality and makes the educational process itself more versatile (Lamanauskas, 2007). However, education quality still remains insufficient, as the content of education is poorly oriented towards developing new abilities and competencies necessary for people living in an open public society and market conditions. We need to know the situation of using modern ICT in the process of science education. For example, the research results indicate that using ICT for learning purposes has a little impact on the attractiveness of a subject taught (Lamanauskas, Vilkonis, Klangauskas, 2007). The students agree that texts and pictures included in the printed edition are more useful than the information in the same format on computer. Only slightly more than one fourth of the students use a virtual environment

during their science classes. To conduct science experiments, real objects and substances are usually used. A question if we can support an idea that modern ICT helps with the educational process is not explicit? ICT improvement leads to applying them in different areas of our life (Lamanauskas, 2006). It is essential to know, how students' opinions concerning an evaluation of different methods and means of teaching/learning (traditional and based on applying modern ICT) are distributed.

Quite often reference is made only to teachers' practical experience and insight. Very often such conclusions are not based on any empiric researches, but it is simply stated, that ICT at school gives new opportunities for pedagogues to make students interested in a concrete subject (Baltušytė, Dirsė, 2006). It is simply asserted, that integration of information technologies in the lessons or/and in the project work is a positive thing. Both Lithuanian and foreign researchers don't have a unanimous position about the effectiveness and usefulness of ICT appliance. For instance, Siraj-Blatchford and Whitebread (2003), claim, that ICT appliance in primary education stages, is "unhealthy and hinders learning". The other authors are absolutely in the opposite position asserting, that ICT is an effective instrument in increasing students' achievements in primary classes (Wegerif, Dawes, 2004). It is purposeful to emphasize, that over the latter decade very much attention has been paid to comparative researches in the ICT appliance field, different country experiences have been analysed (Yuen, 2003; Divaharan, Lim Cher Ping, 2010; Falloon, 2010). In recent years, attention has been paid to one more significant factor – the competence of the staff in the terms of ICT appliance. It is stated, that competent staff is essential to the successful deployment of Information and Communications Technology (ICT) in a school (Kit-pui Wong, 2008).

After comparing the Lithuanian and Latvian students` positions some differences were fixed. The most popular science learning methods in Latvia are: communication with classmates, listening to audio information on computer, reading of different texts found on computer and so on. Lithuanian students more favourably evaluate teacher's interpretation, course book information and practical activities. The differences between results obtained for Latvian and Lithuanian students are mostly statistical significant both geographically and in gender aspect. Probably there are different teaching strategy and tactic used by teachers both in science and informatics, as well as students' personal opinion to use ICT and other learning tools (Lamanauskas, Bilbokaitė, Gedrovics, 2010).

It is really interesting to compare Lithuanian and Estonian students` positions on the same issue. The use of ICT in Estonian and Lithuanian comprehensive schools is different. In Estonia there is the high level of schools technological equipment both hardware and software. Also there are the possibilities to create the electronic teaching environments, for example, E-School (http://www.ekool.ee), IVA (http://zope.eenet.ee/hpkiva/start_page), VIKO (http://www.htk.tlu.ee/viko/uudised.php) , Miksike (http://www.miksike.ee/) etc. By the records of the end of year 2005 – one computer with internet connection was divided to 25 students, and one computer divided to 3 teachers (IKT-programmi-seminar…, 2010). The Government program of ICT development has planned the following results: a computer in each class, 1 multimedia projector per 4 classrooms, 3 smart boards in each school and 2 computer class in each school with 16 computers, legal software by the end of year 2010 (The Government program of ICT development, 2010). Besides technical school equipping, constant qualification courses for teachers of different ways to use ICT in the educating process are held (http://www.tiigrihype.ee/?op=body&id=7.

The main research question is as follows: how the students from Latvia and Estonia evaluate the usefulness and the efficiency of teaching/learning methods in science education.

The goal of research is to analyse students` opinion on learning methods in the process of science education in comprehensive school.

Methodology of Research

The methods of inquiry (questionnaire) and systemic and comparative analysis etc. were employed in research. The on-line questionnaire prepared in national languages was used. To ensure the quality of translation and an adequate understanding of the questionnaire, the questions were interpreted by the translators-native speakers. Moreover, they were required to have experience of pedagogical work. The questionnaires were completed in the rooms for teaching informatics under the supervision of a teacher-coordinator.

Research was carried out in October-December, 2007 in Lithuania, Latvia and Estonia. 3345 respondents including 1637 students (48.9%) from Lithuania, 1043 (31.2%) participants from Latvia[2] and 665 (19.9%) learners from Estonia were involved in the survey. Comparative analysis data of Lithuanian and Estonian respondents are given in this article. The distribution of the respondents depending on the age of students is presented in Figure 1.

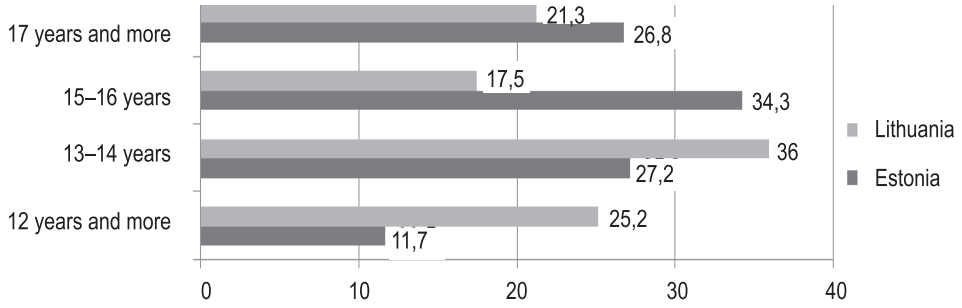

Figure 1. Distribution of the respondents depending on the age of students (%).

The distribution of the respondents depending on the sex of students is shown in Figure 2.

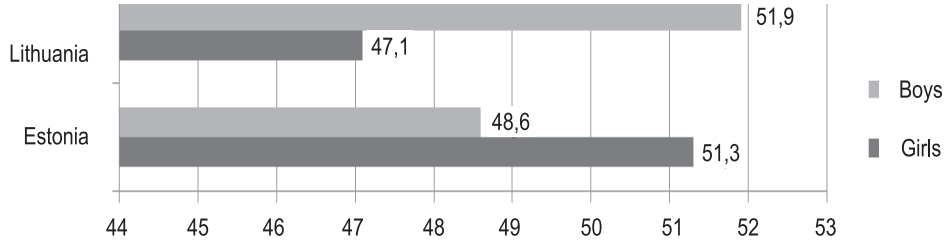

Figure 2. Distribution of the respondents depending on the sex of students (%).

Sampling was structured applying the stochastic method of group selection i.e. a consecutive 'bunch' system. In total, the volume of the sample was 3322 respondents. When sampling capacity is between 1500 and 2000, the bias of capacity does not exceed 3% (Dobrenkov, Kravčenko, 2004). Other reliable sources indicate that when taking capacity is 1500 respondents, the bias of capacity deviate from 1% to 1.5% (Gallup, 1978). Thus, in order to obtain accurate data, a sampling capacity of the undertaken research can be fully accepted.

[2] Results from Latvia are published (Lamanauskas, Bilbokaitė, Gedrovics, 2010)

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The statistical bundle of the SPSS programmes has been applied to analyze research data. To determine the differences between features under analysis the χ^2 criterion have been used. Every statement (learning method) was given the calculated popularity index ($0 \leq PI \leq 1$). The closer is PI value to 1, the more important is the statement to the respondent.

Results of Research

According to their popularity, learning methods have been analysed in Estonian and Lithuanian respondent population separately. Having analysed learning methods according to their evaluation by Estonian students, such type of distribution has been obtained according to popularity index.

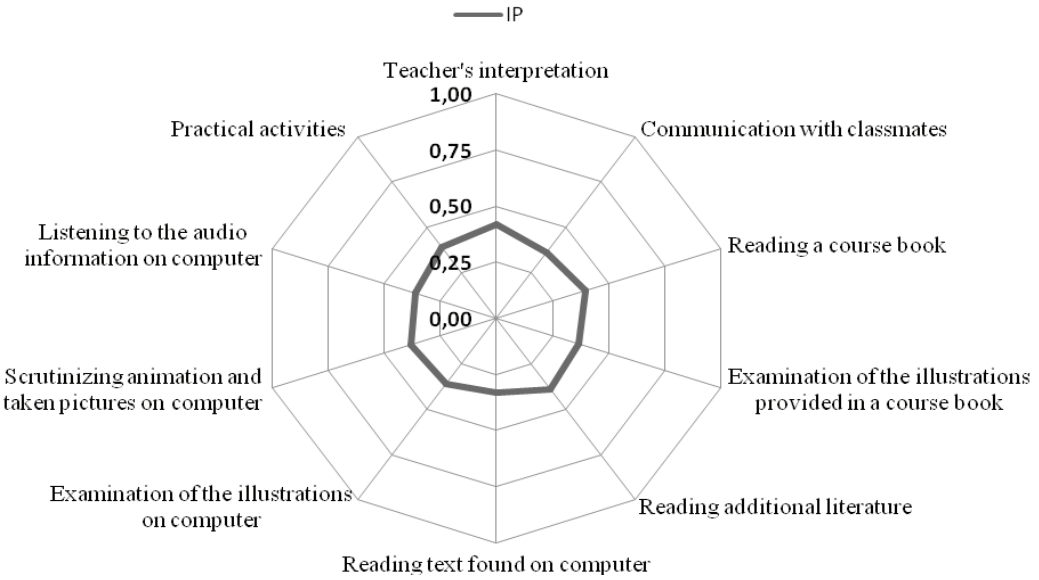

Figure 3. Distribution of the Estonian respondents' opinion (IP).

The popularity indexes reveal that Estonian students lower than average evaluated the assistance of learning tools while learning natural sciences. Most of the indexes fluctuate from 21% to 36% of positive answers, when the best possible evaluation is 100% scale. The statement, showing that for Estonian students the most useful computer visualizations are those which represent two-dimensional, three-dimensional, four-dimensional figures, conveying complicated data, is in the highest position. Photos and diagrams belong to this category as well. Audio information presentation, making the process of learning natural science disciplines easier, is evaluated in a similar way. Visual object representation provided in books and course books and studying of additional literature are less effective for students (PI=0.36). For one third of students learning in Estonia, communication with classmates is worthwhile when you can share information and advise each other. Texts found on computer are less helpful (PI=0.30).The least useful are course book texts, learning from them (PI=0.26) and teachers' interpretations (PI=0.21). It is stated, that for the students learning in Estonia, the most valuable computer technologies are those which reveal learning information in a more interesting and versatile way.

Table 1. Lithuanian and Estonian girls' opinion on learning methods (N/%).

Preposition		Country		Chi square	df	p
		Lithuania	Estonia			
Teacher's interpretation	Helps	477/63,1	63/18,6	198.465	2	**0.000**
	Helps slightly	250/33,1	267/78,8			
	Never helps	29/3,8	9/2,7			
Communication with classmates	Helps	315/41,7	143/42,6	9.601	2	**0.008**
	Helps slightly	389/51,5	152/45,2			
	Never helps	52/6,9	41/12,2			
Reading a course book	Helps	406/54,1	107/31,9	51.251	2	**0.000**
	Helps slightly	311/41,4	191/57,0			
	Never helps	34/4,5	3711,0			
Examination of the illustrations (photos, pictures, diagrams etc.) provided in a course book	Helps	277/37,2	121/36,2	0.090	2	0,956
	Helps slightly	411/55,2	187/56,0			
	Never helps	57/7,7	26/7,8			
Reading additional literature (encyclopaedia, reference books)	Helps	334/44,8	115/34,7	11.831	2	**0.003**
	Helps slightly	333/44,7	185/55,9			
	Never helps	78/10,5	31/9,4			
Reading text found on computer	Helps	223/43,1	96/37,6	6.889	2	**0.032**
	Helps slightly	264/51,1	152/59,6			
	Never helps	30/5,8	7/2,7			
Examination of the illustrations (photos, pictures, diagrams etc.) on computer	Helps	165/32,5	92/32,6	7.788	2	**0.020**
	Helps slightly	277/54,5	171/60,6			
	Never helps	66/13,0	19/6,7			
Scrutinizing animation and taken pictures on computer	Helps	271/51,9	82/31,9	31.926	2	**0.000**
	Helps slightly	205/39,3	155/60,3			
	Never helps	46/8,8	20/7,8			
Listening to the audio information (interpretation, narration, sounds of nature etc.) on computer	Helps	191/39,9	85/34,8	6.491	2	**0.039**
	Helps slightly	224/46,8	137/56,1			
	Never helps	64/13,4	22/9,0			
Practical activities (for example, experimentation, observation)	Helps	302/48,7	68/22,7	73.218	2	**0.000**
	Helps slightly	272/43,9	221/73,9			
	Never helps	46/7,4	10/3,3			

Research data analysis shows, that Lithuanian girls statistically significantly agree more with most of the statements. Lithuanian girls more favourably evaluate teacher's interpretation while learning natural sciences (χ^2 =198.465, df=2, p=0.000). Interpretation of the issues of natural sciences with the classmates is also more useful for Lithuanian girls than for Estonian (χ^2 =9.601, df=2, p=0.008). Analogically, studying from a course book is more useful for Lithuanian girls than for Estonian (χ^2 =51.251, df=2, p=0.000), using additional literature (χ^2 =11.831, df=2, p=0.003) and being engaged in practical activities (χ^2 =73.218, df=2, p=0.000). The benefit of information conveyed with the help of computer is evaluated weaker than previously discussed ways of obtaining information. Computer visualizations are also more beneficial to the girls learning in Lithuania (χ^2 =31.926, df=2, p=0.000). The usefulness of the text on com-

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puter is slightly useful for the girls of both countries, however, statistically significantly is more useful for Lithuanian girls (χ^2 =6.889, df=2, p=0.032). The benefit of illustrations presented on computer screen while learning natural sciences was greatly emphasized in the population of Lithuanian respondents, though the latter acknowledge that the way visual representations are shown, only slightly helps them in learning natural sciences (χ^2 =7.788, df=2, p=0.020). The advantage of audio information on computer is slightly useful to Lithuanian girls, but this benefit is statistically significantly bigger than to Estonian girls (χ^2 =6.491, df=2, p=0.039).

Table 1. Lithuanian and Estonian boys' opinion on learning methods (N/%).

Preposition		Country		Chi square	df	p
		Lithuania	Estonia			
Teacher's interpretation	Helps	513/61,4	69/22,0	151.976	2	**0.000**
	Helps slightly	276/33,0	228/72,8			
	Never helps	47/5,6	16/5,1			
Communication with classmates	Helps	353/42,7%	114/36,4%	4.902	2	0.086
	Helps slightly	404/48,9%	163/52,1%			
	Never helps	70/8,5%	36/11,5%			
Reading a course book	Helps	445/54,3	95/30,4	54.894	2	**0.000**
	Helps slightly	329/40,1	181/57,8			
	Never helps	46/5,6	37/11,8			
Examination of the illustrations (photos, pictures, diagrams etc.) provided in a course book	Helps	356/43,4	105/34,1	8.722	2	**0.013**
	Helps slightly	401/48,8	170/55,2			
	Never helps	64/7,8	33/10,7			
Reading additional literature (encyclopaedia, reference books)	Helps	349/42,7	112/36,8	6.107	2	**0.047**
	Helps slightly	375/45,8	142/46,7			
	Never helps	94/11,5	50/16,4			
Reading text found on computer	Helps	297/47,7	92/37,7	12.300	2	**0.002**
	Helps slightly	285/45,7	143/58,6			
	Never helps	41/6,6	9/3,7			
Examination of the illustrations (photos, pictures, diagrams etc.) on computer	Helps	275/43,4	88/35,9	10.788	2	**0.005**
	Helps slightly	299/47,2	144/58,8			
	Never helps	60/9,5	13/5,3			
Scrutinizing animation and taken pictures on computer	Helps	315/50,6	76/31,7	32.236	2	**0.000**
	Helps slightly	255/41,0	150/62,5			
	Never helps	52/8,4	14/5,8			
Listening to the audio information (interpretation, narration, sounds of nature etc.) on computer	Helps	256/42,5	92/40,2	3.803	2	0.149
	Helps slightly	267/44,4	116/50,7			
	Never helps	79/13,1	21/9,2			
Practical activities (for example, experimentation, observation)	Helps	338/48,6	85/30,4	32.298	2	**0.000**
	Helps slightly	303/43,6	178/63,6			
	Never helps	54/7,8	17/6,1			

In the population of boys there are also a lot of statistically significant differences, comparing their opinion according to countries. It has been stated, that boys learning in Lithuania evaluate better the benefit of various methods while learning natural sciences. Teachers' interpretation (χ^2 =151.976, df=2, p=0.000), learning from course book texts (χ^2 =54.894, df=2, p=0.000), using additional literature (χ^2 =6.107, df=2, p=0.047) and course book illustrations (χ^2 =8.722, df=2, p=0.013) are more favourably evaluated by Lithuanian boys than Estonian.

Information conveyed on computer is also more useful to Lithuanians than to Estonians. Learning natural science subjects, Lithuanians accentuate more the usefulness of reading the text found on computer (χ^2 =12.300, df=2, p=0.002), the benefit of illustrations presented on computer (χ^2 =10.788, df=2, p=0.005), the effectiveness of computer animation (χ^2 =32.236, df=2, p=0.000). Practical observation experience is also more statistically significantly useful for Lithuanian students while learning natural sciences (χ^2 =32.298, df=2, p=0.000).

Conclusions

For the students learning in Estonia the most effective computer technologies are those which reveal learning information in a more interesting and versatile way. The least useful is teachers' interpretation of the material and presentation of information provided in a course book. The analysis of survey results shows that in Estonia students prefer methods of teaching with the use of ICT. This can be explained by the high level of schools technological equipment both hardware and software, also by creation of electronic teaching environments (E-School, IVA, VIKO, Miksike). Results of the research also showed negative side of the heightened ICT usage in educational process – majority of the students think, that traditional teaching methods are not important: teacher's interpretation, reading a course book, experimentation and observation.

Lithuanian students better than Estonian students evaluated the appliance of various methods and technologies helping to learn. Lithuanian girls better than Estonians value the assistance of various teaching tools and methods learning natural sciences. Lithuanian boys also more favourably value the entirety of supplemental tools and methods.

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