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DIGITAL TEACHING AND LEARNING CONTENT IN NATURAL SCIENCE EDUCATION: EDUCATIONAL USEFULNESS EVALUATION

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Abstract

In recent years teaching and learning problems acquire qualitatively new characteristics. It has been thought for a long time that it is an object of classical pedagogy and further research works are not urgent. However, in the process of rapid development of ICT, traditional pedagogy conception also inevitably changes. So-called "classical pedagogy" shifts to "online pedagogy". An adjacent educational trend - a "shift from teaching to learning" is also related with this shift. Thus, on the one hand, ICT is changing very rapidly, new technologies (not necessarily in a proper educational sense) are penetrating into educational practice. On the other hand, under a great influence of ICT, interrelation mechanisms between teachers and pupils change, also, change educational activities and their characteristics. Thus, a need rises to inevitably observe the current situation, to analyse it and to present adequate educational decisions.

Therefore, a complex pedagogical evaluation research was carried out between January and April, 2011. 20 teachers participated in the digital content testing, who totally gave 577 lessons. In the lessons a) an interactive board (IL) was used, and a lesson content was prepared by Power Point (PPT) slide show or Active Inspire (AcIns) programme; b) projector (S), and a lesson content - by PPT or AcIns.

It can be basically asserted, that digital teaching/learning content is a perspective way searching to improve education process.

Key words: *digital content, factor analysis, natural science education, pedagogical evaluation, teaching and learning.*

Introduction

It is obvious, that ICT rapid growth is not only a positive phenomenon. Undoubtedly, ICT is an important component of modern education. The world has significantly and irreversibly changed. One of the evident changes is the significant increase in the amount of information. It becomes more and more complicated to control such tremendous flow of information. The mission of the school isn't only information dissemination as it was characteristic, let's say, 30-40 years ago. One of the main aims of modern school is to form conditions for the teaching content to be perceivable and learnable. One of such formats is digital teaching content. To create digital teaching content and to develop modern teaching and learning services is one of the current Lithuanian education strategies. However, for effective realisation of such strategy, it is necessary to know the main educational digital teaching/learning content usage in educational process peculiarities, under what conditions digital content can be effectively used and so on. On the other hand, it is perhaps not purposeful to move all teaching/learning content

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into digital surroundings. Thus, how to find a proper balance between traditional and digital teaching content?

Quite often what is taught at school is not interesting, even on the contrary is boring, dead. As an example we can mention international ROSE (The Relevance of Science Education) project (http://www.roseproject.no/) the results of which showed that not rarely pupils negatively evaluate natural science disciplines at schools. However, they realise that science and technologies are important for future life. Thus, there is a need to search for new ways and forms of how in reality make pupils interested in certain knowledge sphere. On the other hand, information communication technologies rapidly penetrate into the youth's everyday life. This also has to be in mind. Not in vain, in the centre of attention of education theorists and practitioners is effective application and usage of new technologies in education practice. One of the ways is education digitalisation. First of all, we speak about various material and aids assigned for education. Basically, it is acknowledged that digital teaching aids make teaching/ learning process more interesting, more effective (Digital Teaching..., 2010). Various research works carried out in foreign countries prove the effectiveness of digital teaching content. It is asserted, that digital teaching content (DTC) develops the abilities of corporation (Bennett, Sandore, Miller, 2001), strengthens motivation, being interested in general, develops thinking abilities (Miyata, Ishigami, 2007). Japanese researchers accentuate, that such format suits very well in lower comprehensive school classes (Murai, Nakagawa, Kobayashi, Iwasaki, Matsuno, Iijima, 2009), and in general, digital teaching content application in teaching/learning process together with other technologies strengthens and deepens learners' understanding (Dani, Koenig, 2008).

One of urgent fields is digital teaching/learning content. On February 2nd, 2011 a discussion "Digital textbooks" took place in Education development centre in Vilnius, Lithuania. The essential idea is that only digital teaching/learning objects do not satisfy consumers' hopes. The essential question is what the relation is between traditional teaching content tasks (published textbooks) and digital content. Should digital content replace traditional textbooks? Does digital content make teaching/learning process more effective and helps to achieve better results? How will teaching/ learning quality change using digital textbooks? and so on. In any case, the answers based on objective data are necessary and this creates a new research space. In the strategy implementation aid plan on education content renewal (2007-2012) it was foreseen that it is important to create digital teaching content and develop modern teaching and learning services (General education and training…..,2006). However, this is insufficient. Information communication technology integration into education process can't be an end in itself, a priori claiming that it will be effective on its own. Parallely, it is necessary to form digital teaching/learning infrastructure, to improve programme and technological school supply (Nekrašaitė, Petkus, 2009).

It can be basically asserted, that digital teaching/learning content is a perspective way seeking to improve education process. However, it is not right to refer only to research works carried out in other countries. It is necessary to assess the context of the country, to accomplish representative evaluations in the population of Lithuanian students and teachers.

Defining the Problem

Digital teaching/learning content, as research works carried out in other countries show, can be an effective means in the teaching/learning process. Besides, it is necessary to develop digital literacy of the youth. In the information society it becomes a priority direction in education. There is a lack of such research works in Lithuania. Quite often teachers practitioners "are experimenting" in a very limited space and restrict themselves to only individual digital content component creation, e.g., of various computer teaching programmes. Exhaustive, of

a wider amount experimental research works are necessary, allowing to basically assess DTC importance in teaching/learning practice.

Object, Aim of the Research

The object of this complex research is the digital content of digital presentations and lesson scenarios for "Nature and man "subject lessons. Digital presentations and lesson scenarios are arranged according to the textbook "In scientists' footsteps 5"content.

The main aim is to evaluate the arranged digital teaching/learning content. The evaluation was carried out in four main aspects:

- Didactic;
- Technological;
- Usage;
- Need.

Research Methodology

General Research Characteristics

The presented research was carried out implementing a project "Aurora". The start of the project is August, 2010. The end of the project is May, 2011. During this period the group of researchers accomplished various researches, seeking to evaluate digital teaching content effectiveness and its application possibilities in the 5th forms of comprehensive schools. The main aim of the research is to create digital content and its application scenarios for "Nature and man" subject lessons, using the material of the textbook "In scientists' footsteps 5". Digital lesson content with scenarios for every lesson was successfully arranged and presented in three formats: Active Inspire, PowerPoint and PDF. The arranged material was stored in the internet, CD, USB memory sticks.

The selected group of 20 experienced teachers successfully tried the arranged digital teaching content in education practice. The team of researchers gathered an exhaustive amount of data, data were analysed and generalised. The first quantitative research results were published earlier (Lamanauskas, Šlekienė, Ragulienė, Bilbokaitė, 2011).

Technique and Procedures

The research was carried out in three stages.

The 1st stage: On January 4th, 2011 a teaching seminar was organised for teachers, selected to participate in evaluation experiment. During this seminar, the researchers presented the teachers with evaluation research aims and design. The evaluation procedure was discussed, were presented the instruments used in the research.

The 2nd stage: this stage was going on from the beginning of January till the middle of April, 2011. The teachers gave experimental lessons and carried out an evaluation of each of them. A lesson evaluation sheet was prepared. Teachers, after giving a concrete lesson filled in lesson evaluation sheet. In the evaluation sheet were presented:

34 statements related with the digital content usage;

Two open questions (the respondents were asked to point out the most positive and the most negative aspects of a concrete lesson).

The statements were evaluated in the 5 range scale from "quite agree" to "quite disagree". Also the teachers were asked to give comments which they considered to be necessary.

The teachers handed in the evaluation sheet e-versions to the coordinator of "Aurora"

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project, and a typed version was saved. All evaluation papers were collected in the end, the completion of their fill-in was checked.

Experimental lessons were given in the following order:

1. IB+PPT (Interactive board +Power Point presentation);
2. IB+AcIns (interactive board +Active Inspire presentation);
3. S+PPT (screen + PowerPoint presentation);
4. S +AcIns (screen + Active Inspire presentation).

One group of teachers (11) were using interactive boards + PPT/AcIns + lesson scenarios in the lessons. The second group (10) were using the screen + PPT/AcIns + lesson scenarios in the lessons. In addition, some teachers tried IB/S + lesson content, given in pdf format. The information about teachers having participated in the research is presented.

The 3rd stage: having carried out a preliminary quantitative analysis, a qualitative research plan was prepared. Focus discussions in groups were arranged.

The 4th stage: a generalised evaluation was carried out, presenting a questionnaire to respondents. 7 close questions were presented in it.

Data Analysis

For the evaluation of digital teaching/learning content, every teacher was given to fill in evaluation sheet of every lesson and they were asked to describe in brief their experience/ experiences/ impression realising the scenario of every lesson. It contained 34 close statements, with the 5 range scale from "quite agree" to "quite disagree". The SSPS statistics batch was used as an instrument for data processing. Descriptive statistics, the comparison of the means, factor analysis were applied. Every statement was given the calculated popularity index PI, showing at what level the respondent agrees with the given statement. PI value could vary from 1("quite agree") to 0 ("quite disagree"). The closer is PI value to 1, the more important, more significant is the statement to the respondent, or respondent better approves of it.

Research Results

20 teachers participated in the digital content testing, who totally gave 577 lessons. In the lessons a) an interactive board (IB) was used, and a lesson content was prepared by Power Point (PPT) slide show or Active Inspire (AcIns) programme; b) projector (S), and a lesson content - by PPT or AcIns. According to lesson formats the number of given lessons is presented in table 1.

Table 1. The distribution of given lessons according to lesson formats.

Lesson's format	The number of the lessons
IB+ PPT	102
IB+ AcIns	118
S + PPT	178
S + AcIns	179
Total	577

Every teacher gave from 16 to 38 lessons on average. The teachers allotted 38min. on average for the preparation of the lessons. Mostly 3hours were allotted for the preparation of the lesson and the least 10min. According to the lesson format, the longest time for the preparation was 42min. on average to work with interactive board (IB) + Active Inspire (AcIns) programme. A slightly shorter time was allotted (about 40min.) for the lesson preparation to work with the screen (S) + Active Inspire (AcIns) programme, and the shortest (33min.) – for the work with interactive board (IB) + Power Point (PPT) slides.

A statistical analysis was carried out on every lesson evaluation sheet of 34 statement answers (given 577lessons), which showed that regardless of lesson format, the popularity index of almost all statements is rather high PI > 0.75. Thus, the usage of various formats in the lessons didn't cause great difficulties for the teachers. Regardless of the topic of the lesson (22 different topic lessons were given), statement popularity indexes are also rather high: 0.75<PI<0.96. This shows a very good evaluation of the statements, no matter what lesson topic could be. The statements which got the highest popularity index are: it is more convenient to use interactive board when digital content is prepared (PI = 0.96), digital content usage makes the lesson more effective (PI = 0.92), Active Inspire usage varies the teaching/learning process (PI = 0.94). The statement that digital content of this lesson didn't have to be supplemented by another material (textbook, exercise book, test and other) has the lowest popularity index (PI = 0.51). It means that, nevertheless digital content was prepared very well, teachers still had to use supplementary material for the full realisation of lesson aims.

Factor Analysis of the Statements

A 34 statement factor analysis was carried out applying the principal component analysis method and Varimax rotation seeking to reduce the number of variables, however, not loosing the main information. On the basis of essential characteristics, the factors were distributed into 7 factors. Every statement was given the calculated popularity index (PI).

General evaluation of the statements was obtained (every statement popularity index PI, standard deviation (SD) and correlation inside the factor (σ)). Factor analysis results will be presented in table 2.

Table 2. Factor analysis results on questionnaire statements.

No	Statement	PI	SD	σ	Factor **PI**
The first factor: *Influence on pupils*					
1.	Slide illustrations made the understanding of the lesson easier	0.89	0.13	0.73	**0.88**
2.	The illustrations in the slides made the pupils interested	0.89	0.14	0.71	
3.	Pupils liked digital content	0.88	0.14	0.70	
4.	The usage of digital content makes the lesson more effective	0.91	0.14	0.69	
5.	The usage of slides helps the pupils to concentrate their attention on the lesson	0.90	0.13	0.64	
6.	The prepared lesson scenario is, in general, very interesting	0.82	0.17	0.62	
7.	In general, I liked the lesson	0.84	0.17	0.58	
8.	The presented content supplemented, enriched the lesson	0.90	0.15	0.55	
9.	In general, it was easy to give/realize this lesson	0.84	0.19	0.53	

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The second factor: *DTC and scenario's technical parametres*					
1.	The material in slides is presented attractively	0.86	0.16	0.70	
2.	The text presented in slides is appropriate	0.84	0.16	0.68	
3.	The presented slides' background is appropriate	0.87	0.16	0.66	
4.	The presented illustrations' size and layout is appropriate	0.85	0.17	0.65	
5.	The presented interactive activities (tasks) are appropriate	0.85	0.18	0.62	
6.	Extra editing of slides is appropriate	0.83	0.18	0.56	
7.	The prepared lesson scenario is convenient to use	0.87	0.14	0.55	**0.86**
8.	Navigation in a slide is convenient to use (convenient to enter/exit an so on)	0.88	0.13	0.55	
9.	The font of the prepared digital content text is appropriate	0.82	0.23	0.45	
10.	The procedure of the lesson in the scenario is laid out clearly and understandably	0.89	0.13	0.42	
The third factor: *DTC and scenario's implementation*					
1.	The number of slides presented is optimal	0.76	0.24	0.85	
2.	Slide usage duration in respect of time is optimal	0.75	0.25	0.85	
3.	Lesson activities foreseen in the scenario are being fully implemented	0.76	0.27	0.78	
4.	All presented digital teaching content was useful	0.83	0.22	0.59	**0.77**
5.	Lesson scenario was useful	0.87	0.16	0.56	
The fourth factor: *Active Inspire peculiarities*					
1.	Active Inspire usage diversifies teaching/learning process	0.94	0.12	0.73	
2.	All Active Inspire tools were convenient to use	0.88	0.19	0.69	
3.	Using Active Inspire the lesson is understood quicker	0.88	0.17	0.67	
4.	Interactive board is easier to use when digital content is prepared	0.96	0.10	0.56	**0.91**
The fifth factor: *Extra information presentation*					
1.	It is purposeful to give homework, reminders, etc. in the slide	0.90	0.15	0.72	
2.	The lesson card was useful	0.86	0.13	0.46	**0.88**
The sixth factor: *Extra information*					
1.	Extra illustrations from a bank were useful	0.88	0.13	0.73	
2.	Technological recommendations are clear	0.88	0.13	0.51	**0.88**
The seventh factor: *DTC supplementation*					
1.	Digital content of this lesson didn't have to be supplemented by (textbook, workbook, testing, etc.)	0.51	0.32	0.81	**0.51**

According to the essential characteristics, statements from 1 to 10 were ascribed to factors. The factors were named as follows:

The first factor: Influence on pupils – combined 9 statements and characterised subjective parameters: lesson illustrations made the pupils interested, made the understanding

of the lesson easier, helped to concentrate pupils' attention, made the lesson more effective, the content supplemented, enriched the lesson and so on. This factor's PI = 0.88.

The second factor: DTC and scenario's technical parameters – combined 10 statements and characterised material presentation, technical parameters of the slides: The material in slides is presented attractively, the text presented in slides is appropriate, navigation in a slide is convenient to use, the presented illustrations' size and layout is appropriate, the lesson scenario is convenient to use and so on. This factor's PI = 0.86.

The third factor: DTC and scenario's implementation – combined 5 statements and characterised digital content and scenario's implementation optimality criteria: the number of slides presented is optimal; slide usage duration in respect of time is optimal, the foreseen activities are being fully implemented and so on. This factor's PI = 0.77.

The fourth factor: Active inspire peculiarities - combined 4 statements and characterised Active Inspire peculiarities: all AcIns tools were convenient to use, AcIns usage diversified the lesson, the lesson was understood quicker and so on. This factor's PI = 0.91.

The fifth factor: Extra information presentation – combined 2 statements characterising the purposefulness of using slides and giving homework and reminders, the usefulness of the lesson card. This factor's PI = 0.88.

The sixth factor: Extra information: combined 2 factors about technological recommendations and the usefulness of extra illustrations from a bank. This factor's PI = 0.88.

The seventh factor: DTC supplementation – formed from 1 statement about digital content supplementation by another material. This one statement shows that digital teaching content was arranged so that it had to be supplemented by another material (textbook, workbook and other). This factor's PI = 0.51).

Factor popularity index distribution is presented in a diagram (Figure 1).

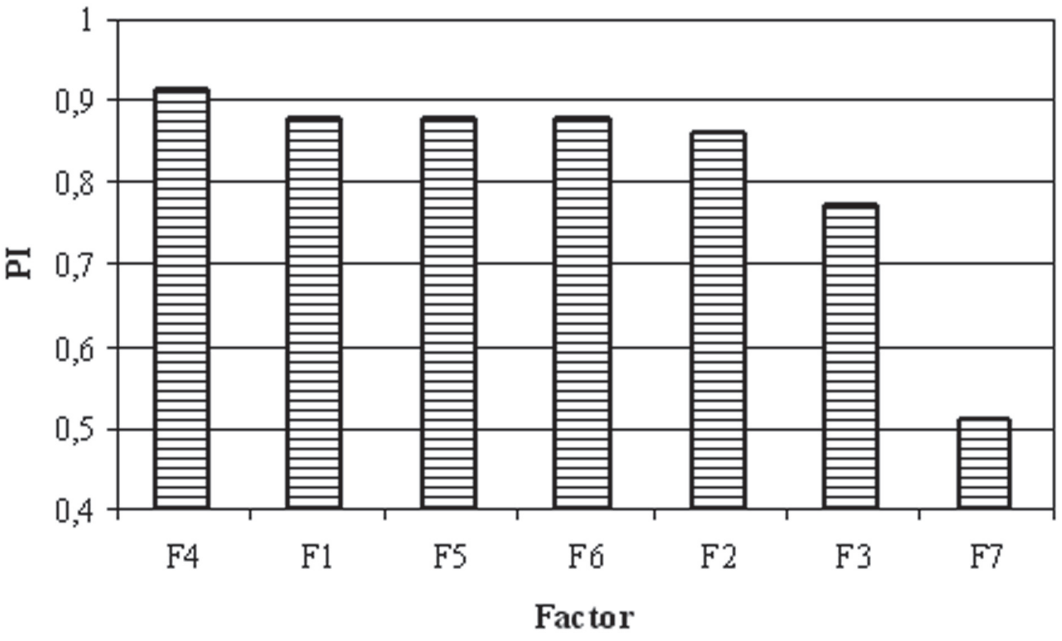

Figure 1: Factor popularity index distribution.

The obtained result shows, that the fourth factor has the strongest expression (Active Inspire peculiarities) characterising a very concrete programme and work peculiarities with it. The seventh factor (DTC supplementation) has the weakest expression, which confirms the

above mentioned conclusion about digital content supplementation necessity by another material (textbooks, workbooks, testing and other). The popularity indexes of the other factors are very high. The third factor has a slightly weaker expression (DTC and scenario implementation), characterising digital content implementation optimality criteria: whether the number of presented slides is optimal, whether slide usage duration in respect of time is optimal, whether foreseen activities are being fully implemented and so on. This shows that attention still should be paid to digital content implementation optimality criteria.

Factor PI dependence on lesson giving format was analysed: IB + PPT, IB + AcIns, S + PPT, S + AcIns.

While giving a lesson, using IB + PPT form, the 4th and the 6th factors have the strongest expression (PI = 0.93). The weakest expression have the 3rd (PI =0.68) and the 7th (PI = 0.58) factors. While giving a lesson, using S + PPT form, the 4th factor has the strongest expression (PI = 0.98), and the 7th – the weakest expression (PI = 0.50). Thus, the teachers evaluated the peculiarities of Active Inspire programme very well: all AcIns tools were convenient to use, AcIns usage diversified the lesson, the lesson was understood quicker and so on, and slide usage technological recommendations and purposefulness of giving homework and reminders as well. The 3rd and the 7th factors about digital teaching/learning content implementation and supplementation peculiarities have the weakest expression.

Statement's correlation inside the factor (σ) shows its strength and importance to this factor. The biggest correlation of statements in the first factor: Slide illustrations made the understanding of the lesson easier ($PI = 0.89$, $SD = 0.13$, $\sigma = 0.73$), The illustrations in the slides made the pupils interested ($PI = 0.89$, $SD = 0.14$, $\sigma = 0.71$), The pupils liked digital content ($PI = 0.88$, $SD = 0.14$, $\sigma = 0.70$). The biggest correlation of statements in the 2nd factor about DTC and scenario's technical parameters: The material in slides is presented attractively ($PI = 0.86$, $SD = 0.16$, $\sigma = 0.70$), The text presented in slides is appropriate ($PI = 0.84$, $SD = 0.16$, $\sigma = 0.68$). In the third factor about DTC and scenario's implementation possibilities - The number of slides presented is optimal ($PI = 0.76$, $SD = 0.24$, $\sigma = 0.85$), Slide usage duration in respect of time is optimal ($PI = 0.75$, $SD = 0.25$, $\sigma = 0.85$).

Comparing the 4th, the 5th and the 9th statements of the 1st factor, according to given lesson formats (Figure 2), one can see that regardless of the format the lesson is given, digital content usage similarly makes the lesson more effective (the 4th statement, $PI = 0.93 – 0.89$).

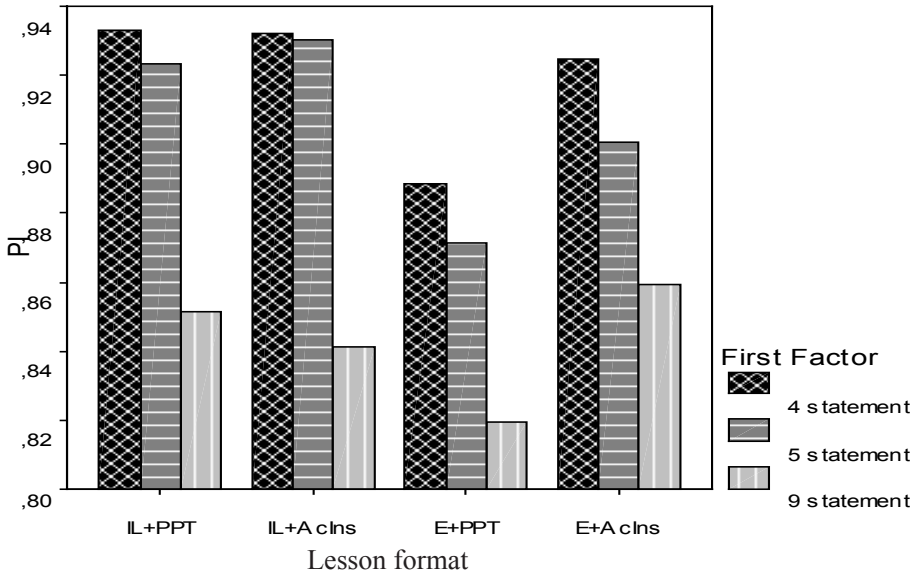

Figure 2: The statements of the first factor and lesson giving forms.

The lessons given using IB + PPT and IB + AcIns have the biggest PI. This shows that the lesson with interactive board makes a great influence on lesson effectiveness. The 5th statement has similar PI: The usage of slides helps the pupils to concentrate their attention on the lesson (*PI* = 0.92 – 0.87). A slightly smaller *PI* = 0.89 – 0.87, giving a lesson with projector (S), when the content of the lesson is prepared using Power Point (PPT) slides. Perhaps, the projector and PPT are more common in the lessons therefore they made not a very great influence on the pupils. The 9th statement - In general, it was easy to give/realize this lesson – is weaker in this factor (*PI* = 0.86 – 0.82). It might seem that it has a slight influence on the pupils however the results show that all first factor statements have very high popularity indexes. This shows that digital teaching content (DTC) makes a great influence on the pupils.

The statement analysis inside the second (DTC and scenario's technical parameters) factor according to given lesson formats (Figure 3) shows that navigation in a slide is convenient to use (convenient to enter/exit and so on) both working with an interactive board (IB) and with a projector (S), regardless of the lesson format (the 8th statement, PI = 0.88 – 0.85). Extra editing of slides (the 6th statement) was the most difficult for teachers working with IB + AcIns (PI = 0.80). The least expressed PI is of the 5th statement - The presented interactive activities (tasks) are suitable – giving lessons with IB + PPT and IB + AcIns. It might seem that it should be difficult for the teachers to work with a rather new Active Inspire (AcIns) programme, but it is observed that work with an interactive board (IB) causes more difficulties for the teachers.

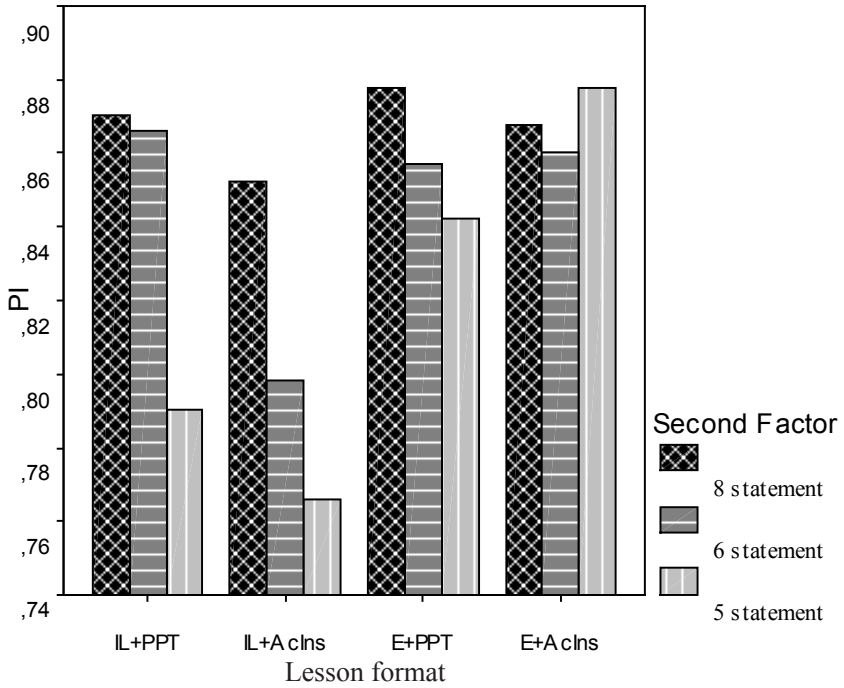

Figure 3: The statements of the 2nd factor and lesson giving forms.

The main statement analysis of the 3rd factor (DTC and scenario's implementation) (Figure 4) according to given lesson formats shows that the highest PI = 0.87-0.79 is of the 4th statement All presented digital teaching content was useful.

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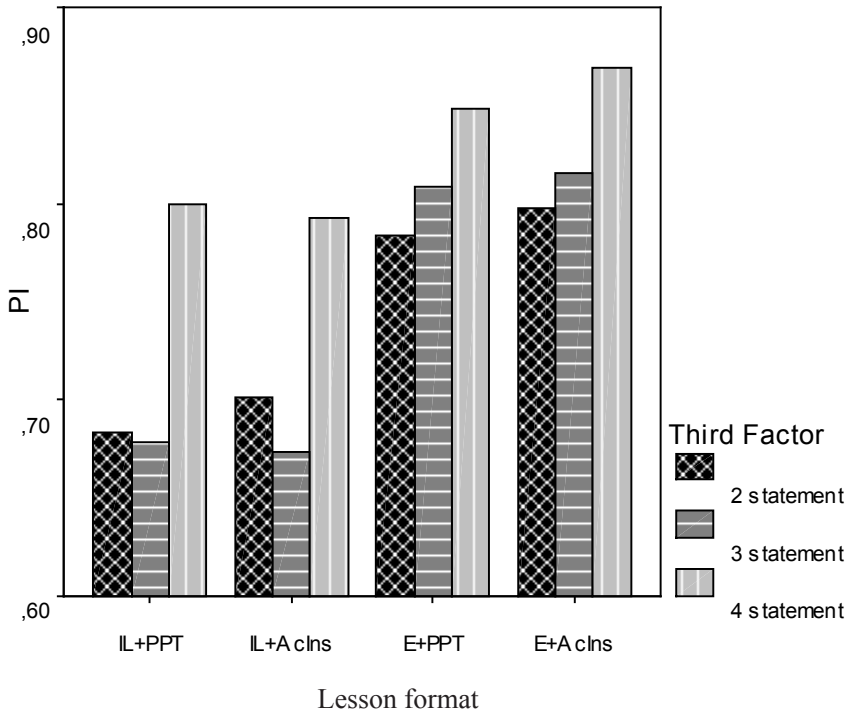

Figure 4: The statements of the 3rd factor and lesson giving forms.

It can be observed that working with S + PPT and S + AcIns, all three statements' PI is rather high. Working with an interactive board it was more difficult for teachers to properly use in respect of time the slides presented in digital teaching content (the 2nd statement, *PI* = 0.70 – 0.68) and fully implement activities foreseen in scenario (the 3rd statement, *PI* = 0.68 – 0.67). This confirms the above mentioned idea that teachers still are not able enough to work with an interactive board.

Discussion

It is obvious, that digital teaching content is a new education reality. Having carried out quantitative evaluation, it has been stated, that digital teaching/learning content is a perspective way seeking to improve education process. Digital teaching/learning content together with prepared lesson scenarios for its realisation is, undoubtedly, an innovative phenomenon in educational practice. In general, it is digital teaching. The researchers notice, that it is new "high art" of teaching with digital technologies (Cauthen, Halpin, 2011). On the other hand, an essential question arises: How teachers might develop the digital teaching skills to use ICT to transform schools. It is obvious, when there is proper interaction between pupils and teachers, then necessary teaching/learning process effectiveness is achieved. It is obvious, that students tend to learn in different ways and that they prefer to use different teaching resources as well (Franzoni, Assar, 2009).In this respect, the carried out research confirmed that digital teaching content application improves teaching process. It has been stated, that DTC usage makes the lesson more effective regardless of lesson topic (it makes it more interesting, diverse, more attractive), develops pupils' cognitive and psychosocial abilities, strengthens learning motivation, makes the teaching/learning process active. The researchers notice, that the role of digital teaching portfolios in teachers' professional development and classroom practice is

very important (Milman, Kilbane, 2005). N. B. Milman ir C. R. Kilbane stated, that creating digital teaching portfolios fostered teachers` authentic professional development. The other researchers also notice that digital technologies and their application increase user creativity, contributing to unique forms of communication and community building that support a "social constructivism" (Chelliah, Clarke, 2011). The authors make a conclusion, that traditional pedagogical models cannot be sustained into the future. Though, unanimously such position can't be agreed on, nevertheless, this once again shows the urgency of researches in that sphere. However, searching for only positive moments is not a proper scientific approach. It is much more important to identify negative DTC application moments. Teachers' experience is a very important aspect. It is obvious, that teachers, having big experience participated in the carried out research, the teachers, who were able to discern various both positive and negative digital teaching content application aspects. It is necessary to agree with the researchers' position that certain differences exist between the experienced and starting pedagogical career teachers, despite the fact, that the latter have already basic experience in ICT field. Beginning teachers are joining the profession experienced in the use of digital technologies in their personal and academic lives, but much of the research to date has focused on experienced teachers as they learn to use digital technologies and explore the use in their own classrooms (Starkey, 2010). Moreover, some researchers claim, that digital technologies are not very effective in teaching process. Buzzard, C, Crittenden, V. L., Crittenden, W. F., McCarty, P. (2011) claim, that students prefer more traditional instructional technology for effective engagement and learning. This shows once again, that there is no unanimous position. Digital teaching and learning should be meaningful and understandable. It is believable, that further researches will answer the principal question how to use digital technologies and resources that could help students' better understanding.

Conclusions

- The carried out statistical analysis showed that regardless of lesson format and lesson topic, the popularity index of almost all statements is rather high. Thus, different format (IB + PPT, IB + AcIns, S + PPT or S + AcIns) usage didn't cause any bigger difficulties for the teachers.
- It has been stated, that DTC usage:
    - o makes the lesson more effective, regardless of lesson topic: it makes it more interesting, diverse, attractive;
    - o makes a great influence on the pupils: makes them interested, makes the lesson understanding easier, helps to concentrate pupils' attention and so on;
    - o develops pupils' cognitive and psychosocial abilities, strengthens teaching motivation, makes teaching/learning process active.
- Teachers evaluate Active Inspire programme peculiarities very well: all AcIns tools were convenient to use, AcIns usage diversified the lesson, the lesson was understood quicker and so on. However, teachers also accentuate the advantages of PPT format lessons. Thus, it would be good not to limit oneself with one format, but to prepare digital content in two formats (AcIns and PPT), enabling to work both with a computer projector and an interactive board.
- Generalizing research results, it can be asserted, that digital content set to the textbook

" In scientists' footsteps" for "Nature and man" subject lessons, is very valuable in educational sense and expanding it by other topics it is necessary to give them to other schools to use.

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