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E-Learning in the Modern Curriculum Development

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1. Introduction

In the evolution of web technology we have reached the level 3.0 (semantic web). But this does not mean that older technologies are extinct. They are still present and still flourish in some environments, especially Web 2.0 technology is regularly mentioned in the educational fields. In the scientific world only publications in "Web of science" are important, all the rest is meaningless. This concept gradually spread into the lower levels of education and the concept of information and resources quality was therefore set.

Today kids are digital natives or digi-kids. The concept "pencil and notebook" is strangest to them than the concept "computer and web". Doing homework mainly means copying and pasting topics from the web, while traditional writing is perceived as an extremely boring task. The speed of data manipulation have changed even the meaning of contemporary words. While we still use the concept of snail-mail for traditional post mail, contemporary kids use this expression for e-mail. Kids seem to be impatient; what takes more than few seconds for the response is useless. Even literacy has changed. There is no time to formulate proper linguistic sentences because of all the rush. Typing proper words in SMSs takes too much time and acronyms emerge daily (e.g. 4u = for you, tm1030bbbs = tomorrow at 10:30 bring basketball ball to school). Frustrated teachers observe that their students score less points every year and quality of study is going down. On the other hand, policy makers see only numbers and quality degradation is welcome excuse to decrease budgets and increase workload. Generalization as for example "lazy teachers who are overpaid and work nothing" is common.

Many authors agree that new generations of students can upgrade their competences with higher quality e-learning materials. In the past years the Ministry of Education of the Republic of Slovenia has funded many projects of e-learning materials production. As the result almost entire primary school curricula is covered. Along with the textual content, multimedia elements and interactivity was required in these projects. Most of e-learning materials are therefore Web 2.0 compliant. But we know that interactive multimedia e-learning materials do not guarantee quality. Perception of quality of web materials changes according to learner's age. In general primary school students do not discriminate web content (all materials are good for them), while the secondary school students begin to

distinguish between good and bad web materials. At the university level understanding of web materials and multiple verifications of the acquired knowledge deepens. At that point students are aware that Wikipedia is definitely not the ultimate knowledge resource. The concept of verification of web contents mostly corresponds to the credibility of the author. If an author is well known and the contents are on renowned institution's web page it is considered to be valid.

How important are indeed the usage of Web 2.0 technology and the reputation of e-material's institution, we wanted to explore by preparing the quantification of narrow topics of physics history (Galileo's research) over major web sources. Research method was web survey of physics students and the research instrument was our e-material in relation with hard facts gathered from web sources. Results show that Web 2.0 technology is not mandatory to perceive e-material as credible. Implications from gathered results also show that curricula must not be fully complete but some time frame must be available for flexibility of contemporary topics that allow teachers to show interdisciplinary use of otherwise almost sterile clean scientific field.

2. E-learning materials in primary level education

There is a steadily growing production of web textbooks, workbooks and other e-materials, and the Web 2.0 technology seems to become mandatory in the production of new e-learning materials (Shneiderman, 2004) (Hofstetter, 2004) (Krašna, et al., 2005) (Smith-Atakan, 2006) (Repnik, et al., 2006) (Lau, 2008) (Krašna, et al., 2008) (Sandia National Laboratories, n.d.). Since there are several types of e-learning materials available on the web at the moment (for self- or blended learning, etc.), a question arises whether the demand for Web 2.0 technology is justified or not. Examples of non-fully-interactive e-learning materials that have been created recently are the materials for primary school including both natural and social science topics at the 3rd year primary school level (Ambrožič Dolinšek, et al., 2009).

Feedbacks from teachers in schools on using e-learning materials are different but they all join in one aspect. They never use the same learning materials from the start to the end. Students prefer changes of styles in learning materials but learning materials cannot change the style from one topic to another though. Such materials would be considered unprofessional and reviewers would grade them low.

Students use different types of e-learning materials and web contents. Even if we provide them high quality interactive multimedia e-learning materials they will still use Wikipedia for additional or complementary information. Wikipedia is not interactive and in most cases multimedia elements are limited to figures only. Despite media restrictions it is still an interesting source for students. Therefore we may rethink our strategies about interactive multimedia learning materials as contemporary pinnacle of e-learning material design.

3. E-materials in context of e-learning forms

There are many debates about e-learning effectiveness. Sometimes production cost may be really high due to multimedia material production but teachers do not like them. We discovered that we cannot prepare learning materials without active role of teachers in this learning process. Our first e-learning materials were very well accepted by students but not

by teachers. Effectiveness of our first e-learning materials was low and especially we failed in the area of knowledge retention. Teachers delivered the students our e-learning materials without carefully defined pedagogical tasks. In short time we have learned the most important lesson: we need teachers in production of e-learning materials and e-learning materials are practically useless if teachers do not support and use them.

In the future development our effort was focused on teachers and their perspective of good e-learning materials. Consequently we included less electronics tests and provide more textual assignments. We did not force the use of LMS (Learning Management System, e.g. Moodle, Drupal etc.) in the education. Textual assignments can be submitted in the LMS, or send by e-mail or even printed out and handed to the teachers. Teachers have different ICT (Information-Communication Technology) and pedagogical skills, and should be autonomous in the classroom.

Autonomous competent teachers have higher quality learning outcomes. For knowledge evaluation tests are needed. Based on the previous research we can categorize tests according to complexity and openness (De Praetere, n.d.). Close and low complex tests are suitable for electronic knowledge evaluation. But higher level of complexity and openness require active involvement of intelligent reviewer – teacher. In our first attempts of e-learning material design we use low complexity and more closed tests: Select I, II, III; Identify I, II, III; Match I, II, II; Correct I, II, Complete I (see Fig. 1). Those tests are easy to implement and electronically assessed. In the next generation of e-learning materials production we use tests (assignments) from Project I, II, III, IV, V and Collaborate I, II, III, IV, V. Results of these type of tests force teacher to assume active role since these assignments still cannot be electronically assessed and verified.

Complexity

Openness

Action	I	II	III	IV	V
Select	True / False	Alternate choice	Multiple choice	Implicit answers	Certainty degree
Identify	Multiple True False	Yes/No with explanation	Multiple Answer	MA with images	Click on image zones
Match	Matching	Categorizing	Sequencing	Prioritizing	Assembling proof
Correct	Remove intruder from a list	Jumbled sentence	Detect wrong form filling	Click errors on an image	Problem solving
Complete	Fill-in blanks	Drop down fill-in blanks	Fill-in form	Calculated answer	Listening comprehens ion
Construct	Lab simulation	Analysed Open Answer	Link concepts on a map	Draw valid sequence	Delineate zone on an image
Project	Open answer / Essay	Word assignment	Spreadsheet assignment	Presentation assignment	Multimedia project
Collaborate	Forum discussion	Documents sharing + peer review	Group publication	Team blog with roles	Problem solving in team

Fig. 1. Complexity and openness in tests/assignments of knowledge assessment (De Praetere, n.d.).

Textual assignments as tests are suitable for higher knowledge retention since they require more mental effort to produce than just clicking right answer. Since we need to prevent copy/paste of text from other works we include the concept of citation. Namely, plagiarism is on a rise (Kaučič, et al., 2010) and we want our students to become aware of importance of citation and respect other's intellectual products. Good presentation can be seen in the figure (Fig. 2) where in a single page users see the use of multimedia materials, pictures and textual assignment. Additional issues that are also highly important in e-learning are navigation and position inside the materials. Therefore we provide global position and topic's navigation.

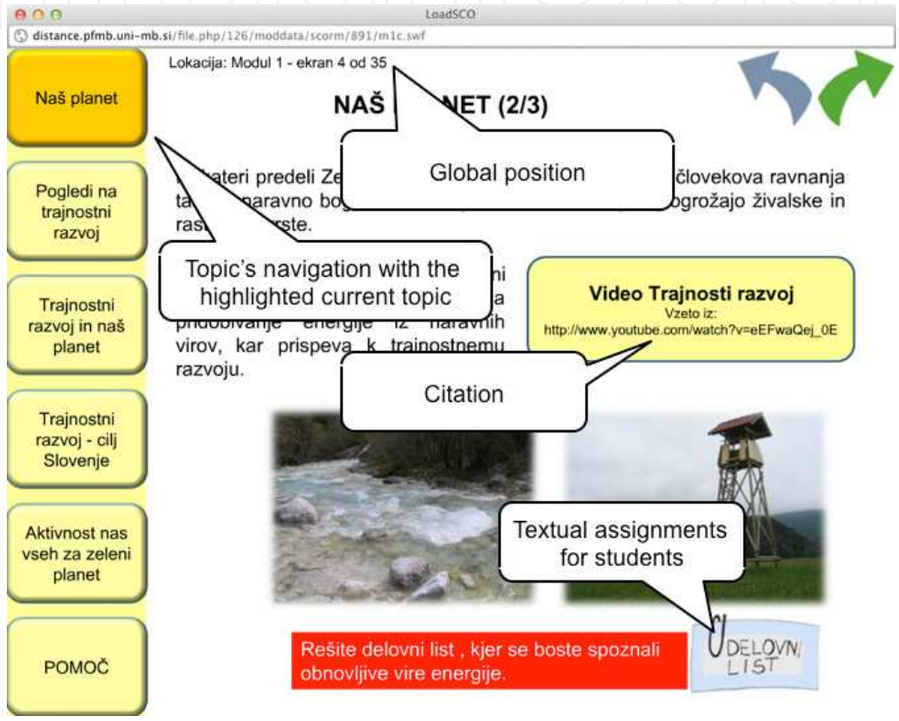

Fig. 2. Elements on the e-learning materials

Interestingly we have found that sometimes even simple web page (Web 1.0 technology) can significantly contribute to the understanding and enhance learning in schools. During the next few years we will gain better insights to the use of our web pages since we introduce the principles of citation into every seminar work and this would give us better insight than mere web hits.

In 2009 e-learning material about Galileo's life and work was prepared. It is suitable for higher classes of primary schools students as well as secondary school students (Repnik, et al., 2009). This interdisciplinary material (including topics from astronomy, physics, mathematics, technology and history of science) was developed for the occasion of the International Year of Astronomy 2009. Preliminary tests of its use in school practice were performed at the end of 2009 in the framework of the national project Development of Natural Science Competences (University of Maribor, Faculty of Natural Sciences and Mathematics, n.d.). In addition, we prepared the questionnaire for teachers and students about the use of e-learning materials.

In the continuation of this paper we describe the results of the school tests of the use of Galileo's web textbook and the results of the questionnaire. In addition, we compare the structure of our e-learning material and some similar e-learning materials on Galileo. Next, we discuss the question about the common demand for Web 2.0 in electronic education.

4. E-learning material about Galileo Galilei

The preparation of our web textbook (let us use the term *e-book* from now on for brevity, even for shorter e-learning materials) about Galileo was done mainly in March and April 2009. It was presented to students in April 2009 and after receiving their comments it was upgraded in summer months. We have divided the e-book into the following sections with subsections (Ambrožič, et al., 2009):

- Home page with short introduction
- Biography
  - Scientific work
  - Galileo's teachers, coworkers and students
  - Publications
  - »De motu« (about movement)
  - Writers about Galileo
- Development of Astronomy
- Technology
  - Telescope
  - Pendulum
  - Sector
  - Thermometer
  - Pump and hydrostatic balance
- Observations
  - Moon
  - Phases of Venus
  - Sunspots
  - Saturn
  - Jupiter's satellites
- Theory of tides
- Mechanics

This e-book was developed with the help of our students of educational physics. As mentioned above, they tested the material and gave useful comments about it. Even more, some students cooperated in the preparation of the book: they prepared the initial interface and design of it. They also prepared a few topics (which were subsequently reviewed before inserting in the main text), but professors of physics and astronomy wrote the largest part of the e-book. The e-book is closed for users and only experts with the provided password may upgrade it. However, the authors are attentive to suggestions from users, so this material was presented to a couple astronomic associations for review and tested at a few schools.

Furthermore, there is a list of references in this e-book as well as the functionality for internal searching through the material by keywords.

5. The results of the school tests

Until now, the Galileo e-book was tested in one primary and two secondary schools in the north-eastern part of Slovenia. The testing procedure was the following. One of the pupils/students read the part of the e-book, prepared the seminar about it and presented the material to his/her schoolmates. The focus of this seminar was on promotion of astronomy and other natural sciences. Then, students answered the questionnaire (test) with 7 questions about astronomy and science in general, which required some level of understanding and not just reproduction of facts. For example, one of the questions (the fourth one) was the following:

> *4) Why are we convinced that the Sun will rise tomorrow? Is this 100% certain? What is the difference between the proof in physics (and biology) and the mathematical proof? (Think about observations of nature, experiments and pure logical reasoning.)*

The goal of answers on such questions was not merely checking the knowledge but revealing the students' wider competencies as are ability of reasoning and imagination. The tests were done within the framework of the national project Development of natural science competences (University of Maribor, Faculty of Natural Sciences and Mathematics, n.d.). In the project, 14 so called *generic competences* (connected with natural sciences as declared in the project) were stressed, among others (key competences, subject-specific competences, etc.). Some of them, such as ability of collecting information, ability of analyzing and organization of information, ability of interpretation, etc., were definitely tested in these school experiments on Galileo e-book. The feedback of these tests was briefly the following. The materials were fine to teachers and most students, but they should have more animations then text explanations. The qualitative results (there was no quantitative marking) of tests were, however, concerning: most answers were bad, from a few words to a sentence or two for each questions. Students showed very poor imagination and ability of reasoning even in the 2nd year of secondary school. Despite several advantages of ICT, the conclusion of these preliminary tests may be taken as a kind of warning against (too) exclusive use of "user friendly" ICT (neglecting other means, such as speech, listening to each other, deep reasoning and thinking effort, handwork and true experiments, etc.).

6. The results of questionnaire for teachers and students

The questionnaire consists of two parts (each of them containing 10 questions) with different number of answers of selection type; in some cases only one answer has to be selected and in other cases more answers can be chosen. The first part of the survey is about e-books in general while the second part is about our Galileo e-book. Only teachers who performed school test on Galileo material answered this part. Since this means only a few teachers the presentation of their opinions in this paper would be irrelevant. We thus focus on the first 10 questions about the use of e-books in general. Maybe two most interesting (important) questions with the corresponding "single-choice" answers are the following (translation from Slovene):

1. *Compare web textbook with the printed one (in regard to its advantages and disadvantages). What do you think about its use in future?*
   a. *Web textbook has predominantly advantages in comparison to printed textbook, thus it should completely supplant it in future.*

   b. *Web textbook should predominantly supplement the printed one, however, because of the knowledge protection copies of printed textbooks must remain.*
   c. *Web textbook has, in my opinion, as many advantages as disadvantages, so it should be used in the same proportion as the printed one.*
   d. *Web textbook could never supplement the printed one, e.g., because of tradition, that's why it should be used only to a minor extent in future.*

2. *If you decided for a frequent use of some web textbook, what would you prefer?*
   a. *Reliability of information, therefore the book should be of closed type, and only experts could supplement it. Expert review slows down the revision/supplementation of the book.*
   b. *Full access, also in regard to supplementation by non-experts, even if the information is consequently less reliable. It enables quick extension of the contents.*

The statistics of the answers on these questions is interesting. We received answers from 52 teachers and students altogether. In more than half of answers on first question the choice was the answer (c) – frequency: 30 times from 52 possible, i.e., the web and printed materials should be used in equal proportions in future. In regard to 2th question, the far most frequent choice was the answer (a) – frequency 41 (!), i.e., students and teachers prefer reliability of information as compared to full access for users. Three questions were about various advantages and disadvantages of e-books as compared to printed material with more than one possible choices; multimedia diversity in material presentation was chosen as the most common advantage while burdening the eyes was selected most frequently as one of main disadvantages. There was also a question of when (what age, level?) the pupils/students should start using e-books: the most frequent opinion was – in the third triad of 9-year primary school (frequency 27). On the contrary, opinions about connection of pure scientific vs. interdisciplinary approach and age span (one narrow age group vs. wider age span) were almost the same. In the last two questions, the opinion about connection of using the e-book for seminar preparation (by pupil or student) with general and key competences (as declared in our national project according to international some conventions) was searched. Three most frequently chosen *generic competences* (from the list of several competences in connection with natural sciences) were 1) ability of collecting information, 2) ability of literature analysis and organization of information, and 3) ability of interpretation. From the 8 *key competences* declared by EU that are essentially very general and should be developed for any person:

1. Mathematical competence and basic competences in science and technology.
2. Digital literacy.
3. Communication in native language in the area of natural sciences.
4. Learning of learning.
5. Communication in foreign languages.
6. Social and citizen competences.
7. Self-initiation and activity.
8. *Cultural consciousness and expression.*

Among them, the second one has been selected most frequently, but also the 1st, 4th and 5th seem to be important, in teachers'/students' opinion. And finally one of the questions was about the frequency of using web textbooks. Teachers and students had different questions about this topic. Teachers assessed the usability of e-books from their pupils and students

perspective. Since in this relatively short period we have only the results from primary schools. As expected almost no pupils in primary school in the sample have already used the e-books (when they are not forced to). Students mostly used e-books on their own initiative.

7. Comparison of our e-material with other available e-books on Galileo

Finally, a qualitative and quantitative comparison between our e-book (Ambrožič, et al., 2009) and four others on Galileo (two in Slovene and two in English) (Rice University) (Wikipedia) (Dolenc) was done, in regard to the number of key words, sections, figures, etc. The free software package AntConc 3.2.1w was used to count keywords and analyze their network in textual documents. In the continuation, we will use the following abbreviations for the five e-books in comparison: *FNM* (Faculty of Natural Sciences and Mathematics) (Ambrožič, et al., 2009), *Rice* (material form Rice University), *Wiki-eng* (Wikipedia – English version), *Wiki-slo* (Wikipedia – Slovene version), and *Quark* (Kvarkadabra, eng. "Quarkadabra" after *quarks* and *abracadabra*) (Dolenc). Home pages of two of them (*FNM* and *Rice*) are shown in Fig. 3 and Fig. 4. The most important information source and sample for *FNM* was the material *Rice* since it is more extensive than other sources. Nevertheless, we used our own ideas in supplementation the contents of the material. First, we present some qualitative similarities and differences between the 5 materials. The structure of *Wiki-eng*, *Wiki-slo* and *Quark* is very simple: they are presented on a single (elongated) page, but *Wiki-slo* is much shorter than the other two. Menu bars in both Wikipedia materials just enable quick access (jump) on the desired topic on the same page. *FNM* and *Rice* have slightly more complex structure: its section (subsection) has its own page and is accessed by menu bar. The index menu in *FNM* works in a slightly different way as compared to *Rice*: when the subsection is chosen the bars for other subsections are still visible, contrary to the *Rice* system (Fig. 4). The depth level in *Quark* is 1: this material has only sections indicated by addresses in bold letters, but not enumerated. *Wiki-eng* has 2 levels of depths: there are enumerated sections and only the 3rd section – Astronomy is further divided into 3 subsections. Slovene version *Wiki-slo* is much simplified: there are no subsections at all, so the depth of levels is 1. *FNM* has two levels: sections and subsections although not all the sections are divided into subsections (see the structure above). *Rice* has the depth 2 or 3 (this is a matter of interpretation): there are usually sections and subsections, as in our e-book, but the section Science in divided into groups of subsections.

Some quantitative comparison of the e-books is presented in Table 1: number of words, figures, external links, and number of subsections. 15 most frequent keywords relevant for astronomy and science in general presented in all 5 materials are counted and shown in Table 2.

Some comments to Table 1 are the following. Subsections are counted in all sections together in the first row. The (horizontal) width is the largest number of subsections in any of the sections, or respectively, the number of sections if this exceeds the former value. Only the sections with actual contents are included in this counting: Notes, References, etc., are excluded from this counting. The same holds for counting words through the e-materials. The row labeled *Words* shows the total number of words, without those in Notes, References, etc. The depth and width in *Rice* depends on how we count levels as mentioned above (do we take the grouping of subsections in the sections Science as an intermediate

level or not). Finally we note, that in contrast to other e-materials in our material *FNM* each section starts with some text before it is split into subsections, thus we have added the number of sections to the number of all subsections just in our case (first data row in table).

Number Of	**FNM**	**Rice**	**Wiki-eng**	**Wiki-slo**	**Quark**
All sub-sections	20	64	11	1	10
Words	18500	57634	8106	819	3326
Figures	59	176	13	2	6
Links	139	19	333	111	2
References	14	185	89	1	0
Width	6	43 (21)	9	1	10
Depth	2	2 (3)	2	1	1

Table 1. Number of different elements in five e-books.

WORD	FNM	Rice	Wiki-eng	Wiki-slo	Quark
Galileo	214	646	205	34	77
Observation	92	175	48	8	7
Publish	8	153	20	2	2
Telescope	73	142	37	0	3
Copernican	17	139	16	2	22
Moon	109	128	8	4	4
Motion	91	125	15	6	10
Earth	125	123	27	4	9
System	27	103	19	8	13
Kepler	14	98	11	0	5
Theory	31	95	25	0	4
Sun	38	93	21	4	8
University	15	92	6	3	7
Jupiter	45	85	14	2	2
Satellites	27	74	8	2	1

Table 2. Number of 15 most frequent keywords connected with astronomy and science in the five (5) e-books. The words are sorted by their frequency in the material *Rice*.

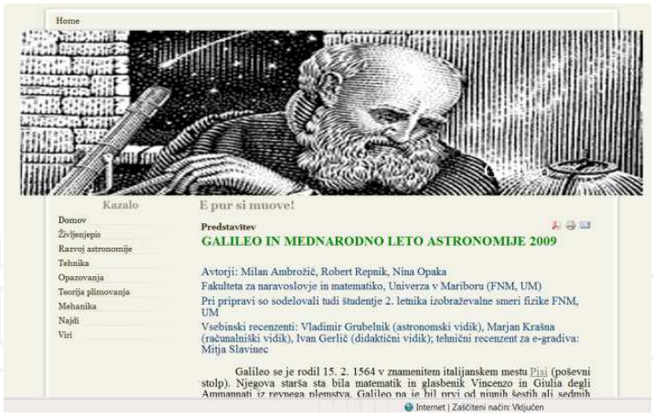

Fig. 3. The structure of *FNM's* (Faculty of Natural sciences and Mathematics) web portal about Galileo.

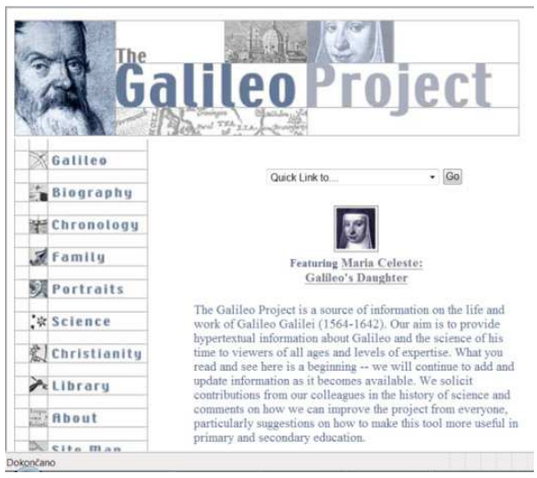

Fig. 4. The structure of *Rice* e-books about Galileo

Fig. 5. Open subsection Telescope in *FNM*

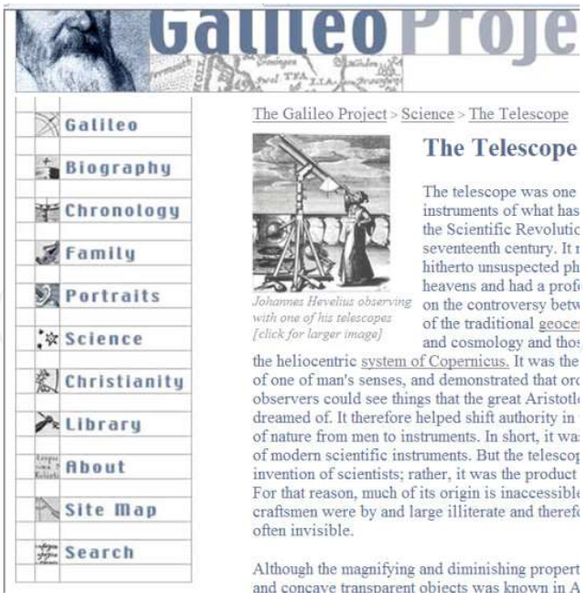

Fig. 6. Open subsection Telescope in *Rice*

8. Discussion

The preliminary results of testing our e-book on Galileo at schools and the results of the survey on e-books in general indicate some important conclusions. Teachers, pupils and students (but certainly not all of them) are prone to using e-books for teaching and learning. Most pupils in primary school have not used them yet. By teachers' opinion pupils ought to start using the e-books in the third triad of primary school. On the other hand, the majority of students at high school (at least in the educational physics) have already used e-books on their own initiative. We are going to encourage the teachers from secondary school to participate in this survey and we expect the results about the using of e-materials by students will be interesting and instructive. At the time being, they generally consider printed books and e-books as equally important. Another very significant observation in this small research of respondents' opinion was the user's preference to the information reliability over the fully open access to e-books.

The size of our e-book on Galileo is about one third of the corresponding material by Rice: this is roughly seen in number of words, figures and subsections. However, many professors from different universities in USA cooperated in the creation of the *Rice* e-book, while only a few people worked on our e-book for a couple of months. Nevertheless, the stuff and presentation of it in Rice gave us several useful ideas for our e-book. In the second part of our survey we also collect the opinions whether to extend our material further or not. Nevertheless, the extensiveness of our e-book (see FNM in Tables 1 and 2) is much larger than for other materials in Slovene language. What has become more evident in others' opinion is that the e-book should include more multimedia elements. Therefore, the preparation of videos of experiments and also some animations (connected with Galileo's work) is in progress. Our students will do this work and their products will extend the Galileo e-book.

Comparison of a few numbers in the two e-books in English in Table 1 (Rice and Wiki-eng), particularly the number of links and references, illuminates two opposite philosophies in the creation of e-books. Rice has very few external links and this material relies much more on references (which are mostly books and articles in scientific journals). The meaning of this is obvious: the Rice material puts the reliability of information on first place. It is difficult to imagine how much time it took for the authors to go through all the literature and crosscheck the sources (185 references!). On the other hand, Wikipedia relies on the broad audience and openness of the materials that is evident in many links. In regard to both the number of links and openness our e-book is between those of Rice and Wikipedia. We have directed many links to Wikipedia pages, where the information is not 100% reliable, but nevertheless we have read carefully the corresponding Wikipedia pages to see if information there is satisfactory. Many natural phenomena that were part of our web-book were tested this way but it is not the topic of this article to explain them in details.

The authors have decided that our e-book is going to be closed for editing. New topics will be collected and moderated and only if sufficient quality of the proposed topics could be achieved we are going to add them to the e-book. The proposals for new topics are not a part of our e-book. A news form is added where even anonymous users can post the requests and ideas. The changes and addition to the e-book is subjected mainly to the spare time of our authors who review and verify articles and then add them.

E-learning materials are not snapshots in the time. They change, evolve and mature. We will continue with our effort to improve the materials and customize them to the customers' wishes and preferences. Recently, (Kaučič, et al., 2011) showed that narrated e-learning materials have potential to improve learning experience.

9. The curricula changes

It is evident that "*e*" in e-learning means just tools and learning means goals (De Praetere, n.d.). Therefore it is necessary to incorporate ICT into the learning processes. We have changed our learning programs at the university levels according to the Bologna declaration. Accompanying these changes the system was established that enables changes of study programs faster and more suitable to the contemporary educational needs (Government of Republic of Slovenia, n.d.). In the lower levels of education we have project of changing perspective of learning. We need to give competences to the student and not just knowledge. A large project "Development of natural science competences" is at the end and we have prepared basic blocks for future curricula changes (University of Maribor, Faculty of Natural Sciences and Mathematics, n.d.).

At the university level we come to the evaluation period. Changes are necessary and more ICT topics need to be included into study programs. Lecturers who were authors of first changes in study programs discovered they are not ICT literate enough to follow the development in ICT and students were not advancing. Therefore new study courses emerge where e-learning; web technologies; and digital security are taught for pedagogical students (future teachers). What we take for granted has proven wrong. Our students have huge ICT knowledge but this is not deep knowledge at the same time. Shallow knowledge is not sufficient for them to use it effectively in school – either for study purposes or for teaching purposes. Old wisdom is correct again. We need deep and thorough understanding of the topic we want to teach competently.

Changes are inevitable in the curricula for primary schools too. Current curricula for natural science courses in primary schools are very detailed and do not allow teachers to insert any additional topics into the learning process. Only physics allows teachers to apply knowledge of physics on current events (Ministry of Education, Republic of Slovenia). One of such events was tsunami in Japan and nuclear power plant disaster. Such topics are known to boost retention level of students by magnitude and not just mere percentages. Even after years they will know how nuclear power plant works and how dangerous is radiation.

In the following years the curricula will change and acquiring competences will be the focus of learning objectives. ICT will become a second hand in such processes. But changes in the school are not rapid. Schools always have financial problems and new technology takes time to become effective. It is not unusual that schools were equipped with one technology that later proved to be unsuccessful and was replaced with more appropriated. Was money thrown away? Not at all, teachers have ability to experience, use and evaluate the technology and decide that it is not good. Such process is now in the area of interactive boards and tablet computers. Software technology that proves to be effective on traditional computers and interactive tablets – Flash is not suitable for low powered tablet computers. Transformation is costly and who knows if necessary. In year or two tablet computers will be powerful enough to play SWF files without glitches.

10. Conclusion

E-materials are here, with all their advantages and disadvantages (like burdening the eyes). Technology helps in the production of better and more capable e-learning materials but there remains an open question: reliability of information or full openness? Guarantee of quality is something that students are beginning to understand and in this respect we have compared our own e-learning material about Galileo with four other materials. Even a very simple quantitative analysis, such as counting the links and references, illustrates very different approaches in the creation of such materials. It is true that students like attractive e-learning materials but rarely participate in the e-learning material production. In their life they use interactive technology but when the same is applied in the school environment they become much more traditional. Different web technologies are going to coexist and flourish for foreseeable future. Quality of e-learning materials is not measured only with the number of interactive elements and can be achieved even with traditional web pages. Smart use and not extensive use of appropriate technology is the key for the success.

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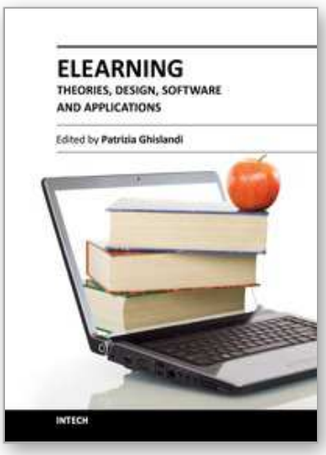

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The term was coined when electronics, with the personal computer, was very popular and internet was still at its dawn. It is a very successful term, by now firmly in schools, universities, and SMEs education and training. Just to give an example 3.5 millions of students were engaged in some online courses in higher education institutions in 2006 in the USA1.eLearning today refers to the use of the network technologies to design, deliver, select, manage and broaden learning and the possibilities made available by internet to offer to the users synchronous and asynchronous learning, so that they can access the courses content anytime and wherever there is an internet connection.

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