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LIST OF CONTENT

WELCOME 7

SUMMARY OF THE KEYNOTE SPEECHES 9

Daria Tataj
"How can the EIT—European Institute of Innovation and Technology—support research, innovation and sustainable economic growth in Europe" 11

Józef Dzieciarz
New possibilities of university performance improvement 12

Slaven Radosevic
Science-industry links in CEE: conventional policy wisdoms facing reality 13

Sohail Luka
Brain circulation: European policies and initiatives for effective and balanced mobility of researchers 14

Krystof Pawłowski
15

Martin Potšcek
Innovations as a tool in strategic thinking: the Czech experience 16

HIGHER EDUCATION 17

Andrea Bencík, Józef Poór, Ildikó Marosi
HR and knowledge management in higher education 19

Alberto Domingo, Ana M. Bajo, Antonio Chiocehes, Verónica Garcia
A complete active and creative teaching-learning method assembled over a client-provider model 29

Małgorzata Dziewińska
The educational potential as a source of competitive advantage of the Polish regions 39

Hannelore De Grande
Ready or not: different views about transferable skills of doctoral candidates in Flanders 51

Nicoleta Gudănescu
Entrepreneurial education financing in Romania 61

Annik Leyman
Home sweet home? International mobility among Flemish doctoral researchers 67

Francisco Mesa, E. Martín
On the social responsibility in engineering education 75

Doina Mihăescu, Valentina Pomanan, Lucian Petcu
Personality factors role in student orientation - towards technical and scientific career 85

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Ilse Bogaert, Marc Vervoort
The interaction between education and scientific research – a condition sine qua non for engineers

Cecilia Collado, Ana M. González Ramos, Milagros S. Ibáñez, Rachel Palmen, Jörg Müller, Núria Vergés
Participation of female workforce in research and innovation from ICT areas

Clara P. Coutinho, João B. Bottentait Junior
Literacy 2.0: preparing digitally wise teachers

Anca Cristea
Occupational standards systems for the environmental sector in Romania

Alberto Domingo, Ana M. Bajo, Antonio Chioches, Verónica García
"PROFESIONALES – EMPRENDEDORES" A mirror to discover motivation, skills and the value of knowledge looking at the own professional future: A collective experience with the students enrolled in first year of chemistry

Mairie G. Doule xposoulou, Gabor Bartha
The ending of old working style promotes a new approach in education

Clara Dumebi Moenke
Using laboratory manual with visual information processing aids to facilitate biology students' acquisition of science skills

József Kapitány
Part I. of Innovation Sutra: Innovation domino. From the leaders' personality through leadership style to innovation supportive organizational culture

Péter Köves, Dorottya Pék
However viable Small- and Medium-sized Enterprises (SMEs) are innovative, majority of them are not even aware of it. Help SMEs with trainings to be more effective in activities related to innovation

Concepción López-Fernández, Ana Serrano-Bedia, Raquel Gómez-López
Patterns of innovation in Spanish hospitality firms

Amanda Martín Mariscal, Luz Fernández Valderrama
Expanded creativity. Towards the collective creation learning

Francisco Mesa, Luis M. Martín, Antonio Gómez
An entrepreneurial approach for the educative innovation

Anya Mihai, Mehmet Sahin, Süleyman Yaldız, Mariana Pastina, Şakir Tasdemir
Shoe design training in a virtual environment

Mirosław Moroz
Entrepreneurs interest in innovation support programmes concerning e-business – an example of Poland

Adri G. W. J. Proveniers, Peter Schmid, Gabriella Schmid-Pal
Collaborative design method holistic participation (MHP)
LITERACY 2.0: PREPARING DIGITALLY WISE TEACHERS

Clara P. Coutinho¹, João B. Bottentuit Junior¹

¹ Universidade do Minho, Braga, Portugal, ccoutinho@iep.uminho.pt
² Universidade do Minho, Braga, Portugal, jbbj@terra.com.br

ABSTRACT
In this paper we present an experience with teachers that used Web 2.0 technologies to develop digital skills and integrate technologies in the curriculum. The theoretical framework sustains the importance of developing technological-pedagogical-content knowledge (TPACK) if we want teachers to use technologies in the classrooms. Recent research shows that teachers’ familiarity, confidence and skills in integrating technology into the curriculum are dependent on the type of education programs teachers attend. 21st century citizens need being able to read and write multiple forms of media and integrating them into a meaningful whole: this is the new hallmark of literacy 2.0 that has to be learned in the school classroom. Aware of this context and responsible for preparing digitally wise teachers we implemented a program with service teachers using Web 2.0 tools—blogs, podcasts and GoogleSites. Education programs must prepare teachers to use technologies in the classroom as cognitive tools that enhance students’ learning. For that to happen, teachers must feel at ease to handle technologies in order to design activities that motivate and engage learners in constructivist learning activities. In this article we describe and evaluate the training experience, reflect on the results and discuss guidelines for further research.

1. INTRODUCTION
The impact of ICT in our global societies held the development of different policies regarding the introduction of information and communication technologies in schools and educational systems [1]. In Portugal, at varied different levels, educational policies recognize the importance that both professional development programs for teachers currently in the classroom and programs for preparing future teachers should provide technology-rich experiences throughout all aspects of the training [2]. Taking these recommendations into account we have developed different learning experiences with Web 2.0 technologies in teacher education programs both at pre-service and post-graduation at the Minho University with promising results [3, 4]. This paper presents another training experience using Blogs, Podcasts and GoogleSites in a group of in-service teachers that attended a compulsory program to certificate pedagogical competencies for teaching K-12 students.

2. DIGITAL LITERACIES 2.0
According to the Wikipedia, "Digital literacy is the ability to locate, organize, understand, evaluate, and create information using digital technology. It involves a working knowledge of current high-technology, and an understanding of how it can be used. Digitally literate people can communicate and work more efficiently,
especially with those who possess the same knowledge and skills" [5]. Digital Literacy
2.0 refers to the above abilities in the use of Web 2.0 technologies, and, according to
[6, p.8] is "the term du jour used to describe the skills, expectations, and perspectives
involved in living in a technological society". For [6], the traditional meaning of the
term literacy—being able to consume and produce words through reading and
writing—has evolved due to the emergence of the Web 2.0 phenomenon: "Because of
inexpensive, easy-to-use, widely distributed new media tools, being literate now
means being able to read and write a number of new media forms, including sound,
graphics, and moving images in addition to text" (ibid). The emergence of the social
web demands the development of collaborative and participatory skills for the
construction and publication of contents through blogs and social networking tools
like MySpace, Google Docs or Youtube, competencies that are crucial for the success
of the XXI century citizen. "Being able to actively create rather than just passively
consume new media is important for the obvious reason that it teaches literacy and
job skills that are highly valued in a digital society" [6, p.9].

In fact, with the change of paradigm from web 1.0 to web 2.0 lots of tools became
available online and those tools enabled people to contribute to the construction
of knowledge in the global network. According to [7], the "Web is now a participatory,
interactive place where we create information collaboratively and share the results.
Everyone can participate thanks to social networking and collaborative tools and the
abundance of Web sites that allow us to post journals, photos, movies, and more. The
Web is no longer a one-way street where someone controls the content. Anyone can
control content in a Web 2.0 world".

The generation of our students can be classified as Net generation, Digital
Generation, Digital Natives, Zap Generation [8; 9; 10]. As [11, online] say "they are
different from any generation before them. They are the first to grow up surrounded
by digital media. Computers are everywhere in the home, school, factory, and office".

To teach this new generation of students is a challenge because the teachers
are Digital Immigrants and the students Digital natives. According to [8] "digital
immigrants don’t believe their students can learn successfully while watching TV or
listening to music, because they (the immigrants) can’t." Teachers of the 21st
century don’t need to be experts in technology but they need to be aware of the potential
these tools have to enhance learning, they have to be digitally wise [12]. This means
keeping in mind they are responsible to develop students’ competencies to find, select
and evaluate the best information available online, because the internet is the most
efficient way to find information, but there is a lot of low quality contents on the web.
It happens due to easiness to create and publish on websites, blogs and internet pages.
As stated by [13], 21st century citizens also need being able to read and write multiple
forms of media and integrating them into a meaningful whole: this the new hallmark
of literacy 2.0 that has to be learned in the school classroom.

3. A THEORETICAL FRAMEWORK: TPACK
[14] consider that the well succeeded integration of technologies in the classroom
csxt context demands from the teacher a set of competences at three levels: scientific/
contents, pedagogic and technological.

For that purpose the authors developed a theoretical model which they named
TPCK or TPACK and that, in the opinion of innumerable more current authors,
should function as a referential for those who develop training courses for teachers, in
particular at the continuous training level, for an effective professional development
of teachers. Such as the authors, we considered that the professional development
of teachers at the ICT competences domain is common to all other curricular areas,
but should show concern with the specificity of each group or disciplinary area,
contemplating its singularity. That is, it is not about giving teachers a standardized
technological training and focusing on the tools domain/knowledge in itself, but on a
modular training put in context and linked to what is the teacher’s pedagogic activity
and to the age level of the students with who he works with [15].

The TPACK model considers that a complete and advantageous integration of
technologies in the teachers’ practices depends on the relation of balance that the
teacher is able to establish between the scientific knowledge and the domain of
contents in that, more or less, specific area of training (C), the pedagogic knowledge
(P) at the level of a competence anchored in learning theories and in techniques and
didactic-pedagogic methodologies and the technological knowledge (T) he possesses,
that is, its domain concerning the tools and other, increasingly available, technological
artefacts which he uses (check Figure 1.).

The dynamic articulation between these three components, represented in their
intersection point (TPCK) is, therefore, essential so that it is possible to reach the level
of highly competent teacher which is, more often, required for a school adapted to the
society of knowledge. In the same way that TPACK is the knowledge which results
from the competences that the teacher has at the scientific, pedagogic and technologic
level, he understands and integrates, in a certain way, three particular aspects of that
knowledge, which are represented in the scheme, by three other intersections:
• PCK (Pedagogical Content Knowledge): as to do with the way to teach a certain
curricular content.
• TCK (Technological Content Knowledge): to know how to select and use technologies adequate to a certain curricular content.
• TPK (Technological Pedagogical Knowledge): how to integrate technologies in the teaching and learning process.

All and each of this knowledge forms are moulded by a myriad of contextual factors such as culture, the teachers training and the school organization itself [8]. Therefore, the TPACK use, in practical terms, is a complex process which is not easily applied, learned or taught. However, and in the measure in which it is a form of professional development, it takes place throughout time, fruit of the teacher's professional experience and, in that sense, many authors study forms of helping teachers to build and use TPACK. [14] tested a learning-by-design collaborative model with teachers and specialists, for curricular units planning, verifying the TPACK construction, but in very diverse forms. [16] defend an approach centered on contents, in which technologies support teaching strategies moulded by trainers for trainees. [17] and [18] suggest that TPACK can be developed when technologies are the focus of reflective investigation-action strategies by teachers undergoing training. Such as [19] we believe that an environment favourable to the construction of that important professional knowledge, should involve teachers in the development/planning of learning strategies which involve ICT’s, in an interaction process with the trainer and the pairs, in which it is given to the trainee time to reflect and justify the options made in pedagogic and technologic terms and experiment the new methodologies in classroom context. It is an interactive and gradual process, in which the teacher appropriates progressively the new knowledge and skills in order to later implement them in the classroom and verify its efficacy in terms of communication dynamics occurred in the teaching and learning process.

4. METHOD
The descriptive survey [30] we present in this paper was developed in school year 2008/09 and enrolled a group of teachers who attended a program on Educational Technology as part of a compulsory professional development program in education. ET is a 3 hours/week class that aims to prepare teachers to integrate technologies in the curriculum. During eight weeks, teachers created a blog for classroom activities where they posted summaries of course readings, images, videos and podcasts that were produced using Audacity software. GoogleSites was also used to create a WebQuest for classroom use.

A final electronic questionnaire was administrated to participants. It was developed by the authors upon a similar questionnaire used in previous studies [31; 32; 33]. It consisted of 21 questions organized according to five categories of dimensions:
1. Personal data (dichotomy/multiple choice): gender, age, professional experience.
2. Acknowledgement of the Web 2.0 concept (dichotomy Y/N).
3. Familiarity with Web 2.0 tools/services (multiple choices: I know/I use for personal purposes/I use in the classroom).

4. Opinion on the educational value of the Web 2.0 technologies experienced in the course activities: blog, podcast and GoogleSites (Multiple choice: open-ended).
5. Opinion on the course for professional development (5 points Likert Scale of agreement: Strongly agree/Agree/Neither agree nor disagree/Disagree/Strongly disagree).

28 teachers participated in the study. As to gender 8 were male and 20 female; 68% had ages between 31-40 years old, 20% more than 40 years old and only 10% less than 30. All taught at intermediary and secondary schools (Kg-12) around the district. Most taught the curricular areas of Economy (72%) or Mathematics (28%). As to awareness of the emergency of the Web 2.0 paradigm before attending the course 59% answered negatively. However, 37% had already built a personal webpage, and three had a personal blog. In summary, we had a group of teachers with very different profiles regarding previous acknowledge with technologies in particular with Web 2.0 technologies.

5. RESULTS
The first question of the questionnaire asked: What Web 2.0 technologies did you know, know but did not use, used for personal purposes or used in the classroom? Teachers had to choose one option for each Web 2.0 tool. Results are shown in Figure 1.

![FIGURE 1. Teachers acknowledgement and use of Web 2.0 technologies](image-url)

We can verify that Del.ici.ous and Flickr are the Web 2.0 tools that teachers are more unfamiliar with, and blogs, His and Youtube are the most referred tools. As to classroom use, most Web 2.0 technologies are either never or scarcely used by participants; Youtube (n=11), Wiki (n=5) and GoogleSites (n=4) are the most used for classroom settings. However, this does not mean that teachers use these tools in the classroom as cognitive tools; previous studies [34; 35] show that Youtube is used in the classroom to present videos and Wikipedia as a source of information, but not for classroom activities that enrol students in learner centered activities where knowledge is shared and constructed. [36] sintehetizes the several forms in which technologies can be used as cognitive tools: a) to support the construction of knowledge (representing the ideas in conceptual maps or conceiving multimedia products), b) to support
the exploration through access to the information and the comparison of different perspectives, c) to support learning through practice, such as when it occurs in the simulations, d) to support learning through conversation (collaborating with others, discussing and defending ideas), e) to support learning through reflection [26]. Next questionnaire section asked for an opinion on the educational value of each of the Web 2.0 technologies experienced in the course activities: blog, podcast and GoogleSites.

5.1. Blogs

Do you believe in the potential of blogs for teaching and learning? At what levels?

All teachers said they agreed that blogs were powerful tools for learning. The most pointed out reasons for using blogs in teaching and learning were: i) blogs increase motivation, ii) more communication inside and outside the classroom, iii) easiness to use, create and leave comments, iv) ideal as space for classroom debate, v) a space to leave actualised information, vi) a different way to teach the curricular subjects and vii) a space for knowledge sharing.

Do you intend to use this tool for classroom activities? What about pedagogical purposes?

Again 89% teachers answered positively (1 teacher said “No”, and 2 teachers said they were already using blogs in the classroom). As to pedagogical purposes for using blogs, teachers said they would use the tool: i) as a portfolio, for students to leave the work develop all year around; ii) To communicate with the students, iii) To post films, news, texts and classroom resources, iv) To diversify pedagogical methods, v) To teach and explain the program topics.

Do you intend that your students to create and manage their own blogs?

26 teachers answered the question: 25 said “Yes” and one answered “I’ll try”. It was important to verify that teachers intended to encourage their students to create and manage blogs for classroom activities. According to the literature, the innovative nature of the pedagogical practices with ICT if not accompanied by training actions that can stimulate a practical and reflective practice among teachers, does not have, by itself, the capacity to operate great changes in the teacher’s pedagogical practices [27]. It is important to invest in training models which allow teachers to use and create digital learning resources, to share problems and to explore new projects with their peers before they try them with their students [28].

5.2. Podcasts

The creation of podcast was considered difficult for 56% of the participants. However only 3 teachers said they did not believe in the potential of the tool for educational purposes. As to reasons pointed out in favour of the educational use of podcast, teachers argued:

- It is a new and innovative way to communicate with students. (T3)
- To give students summaries of the main topics. (T10)
- It allows students to listen to the teacher anytime and anywhere. (T22)
- Students like MP3 and MP4, so why not to allow them to download contents? (T14)
- It allows a different way to learn the curricular topics. (T2)

5.3. GoogleSites

73% of participants said they had no difficulties in using the tool. Two teachers pointed out technical limitations of the tool that did not allow the construction of personalized websites like those built with Frontpage or Dreamweaver. As to classroom use, only 55% of respondents intended to use GoogleSites for pedagogical purposes, to create course and/or class websites (n=6), to create Webquests (n=6), for the development of collaborative work (n=2), and even as an individual portfolio (n=2).

5.4. The impact of ICT in teachers’ professional development

Figure 2 shows the results of the 8 items that evaluated the importance of the learning experience with Web 2.0 technologies in teachers’ professional development program. Data are presented in values of the weighted mean obtained for each item. For data interpretation we considered that the numeric values for means under 3 (for positive or reversed negative items) meant “disagreement” with the statement, values between 3 and 4 “indifference”, and values over 4 that respondents “highly agreed” with the statement.

**FIGURE 2. The importance of Web 2.0 tools experience in the training program**

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale (1-5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was an added value for my professional development</td>
<td></td>
<td>4.2</td>
</tr>
<tr>
<td>I don’t think I will use Web 2.0 tools because schools have no conditions</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Globally, the ICT program was very useful for my professional development</td>
<td>3.55</td>
<td></td>
</tr>
<tr>
<td>To work with Web 2.0 tools made me feel at ease with technologies</td>
<td>4.55</td>
<td></td>
</tr>
<tr>
<td>It opened new ideas for my future teaching practices</td>
<td>4.68</td>
<td></td>
</tr>
<tr>
<td>It was irrelevant for my professional development</td>
<td>1.73</td>
<td></td>
</tr>
<tr>
<td>Tend to use these tools in my class</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Web 2.0 tools will help me to prepare more interesting classes for my students</td>
<td>4.81</td>
<td></td>
</tr>
</tbody>
</table>

The first overall remark is that teachers’ expressed a very positive response set regarding the learning experience of using Web 2.0 in their professional development program (all positive agreements over 4 and the negative one above 2). In fact,
teachers’ recognized that the program was very useful for the profession (I=3.4.19), because working with Web 2.0 tools opened new ideas for teaching practices (I=7.4.8) and helped to prepare more interesting classes for the students (I=4.4.79). Teachers recognize that the learning experience was an added value to their professional development (I=4.2, confirmed by negative value in I=6=-1.73) and that they intended to use Web 2.0 tools in the classroom (I=1.4, confirmed by negative value in I=-1.8).

6. CONCLUSIONS
Teacher preparation and professional development is much more than technology training and so the call to integrate technology into education must be used as a start point for educators’ professional growth [25; 30]. As teacher educators in a public university we believe traditional educational practices no longer provide prospective teachers with all the necessary skills for teaching students to be responsible citizens of the fast changing learning society we live. As stated in the 2008 UNESCO report “professional development programs for teachers currently in the classroom and programs for preparing future teachers should provide technology-rich experiences throughout all aspects of the training” [31, p.1].

Web 2.0 technologies offer educators amazing opportunities for creating effective and engaging learning environments for their students. The learning experience we present in this paper intends to sustain the need for new approaches to teacher education programs. In fact, our main purpose was to show that if we want teachers to use technologies in the classroom we need to give them the opportunity to use the technologies to create educational resources/artefacts for the real classroom students. The enthusiasm maintained by teachers all over the course, the quality of the artefacts developed as well as the feedback obtained on the final online survey, shows that teachers valued the learning experience with Web 2.0 tools and that they have a firm intend of incorporating technologies in their teaching practices.

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