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Benefits, barriers and prerequisites for Web 2.0 learning activities in the classroom: The view of Greek pioneer teachers

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Benefits, barriers and prerequisites for Web 2.0 learning activities in the classroom

The view of Greek pioneer teachers

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Abstract

Purpose – This paper aims to identify the learning benefits and the challenges of Web 2.0 educational activities when applied in typical learning settings and as perceived by pioneer educators with extensive Web 2.0 experience.

Design/methodology/approach – The testimonies of 26 Greek primary and secondary education teachers were collected. All teachers had an extensive involvement with Web 2.0 in their classrooms. The interviews were semi-structured and focused on personal case studies, students' views of Web 2.0, problems and prerequisites and educational opportunities of Web 2.0.

Findings – The teachers indicated that Web 2.0 learning activities promote the learner to the center of the learning process, open the schools' doors to society and help students learn how to cooperate and create digital content, while enabling them to reflect more on their thoughts, extend the time-space of the educational dialogue and promote trust between students and teachers. The participants had also to cope with challenges which concerned their colleagues' attitude and the educational environment, the parents' attitude, the amount of time and effort required, the unpredictable character of the activities, the limitations imposed by the curriculum, the overestimation of students' skills and the lack of training opportunities.

Practical implications – The findings can be transformed to a set of critical guidelines for policy makers and for educating the educators.

Originality/value – The set of findings are derived from teachers with a long-term, intensive, daily practice with Web 2.0 and offer an holistic systematic view of problems and opportunities.

Keywords Web 2.0, Internet, Teaching methods, E-Learning, Learning methods

Paper type Research paper

1. Introduction

Proposals for the integration of social media in the school environment have become commonplace in several research studies and political initiatives. However, nowadays, students face a form of cognitive and technological dissonance, as they are making increasing use of Web 2.0 technologies in their daily lives (An and Williams, 2010), but

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on the other hand, they are not allowed to use such tools at their school environment. There is a wealth of literature that discusses the positive impacts of the educational use of Web 2.0 tools on the learning process (An and Williams, 2010; Borthwick *et al.*, 2008; Jenkins *et al.*, 2006; McLoughlin and Lee, 2010; Richardson, 2009). Web 2.0 enthusiasts claim that students will no longer be passive receivers of information, but capable and self-regulated participants (Borthwick *et al.*, 2008), as Web 2.0 tools support personalized learning and the design of personalized learning spaces, resources and environments and also promote learner's self-direction (McLoughlin and Lee, 2010). Individuals can take control of and manage their own learning, reuse and remix content according to their own needs and interests and interact and collaborate with others in the process of learning (An and Williams, 2010). Web 2.0 tools also have the potential to create more interactive learning environments (Richardson, 2009). The learning activity is transformed into a "networking" activity in which the learner works with peers and professionals beyond the confines of the classroom and the school; creates and shares information, knowledge and products; and utilizes, evaluates and delivers his opinion on his peers' creations (Jenkins *et al.*, 2006).

In recent years, the diffusion of Web 2.0 tools in education is increasing. In an attempt to transform teaching and learning, educators in diverse contexts are exploring innovative ways to use Web 2.0 technologies in teaching and designing new types of activities to make learning in the school environment more active and interesting (An and Williams, 2010). However, there are also a great number of instructors who are not convinced of the beneficial aspects of Web 2.0 technologies. The educational effects of the participatory Web are often described in books and magazines with an optimistic view without taking into account the particularities, the limitations and the weaknesses of the real educational environments. Several times, such approaches are inapplicable in reality and cannot be adopted by the majority of teachers. The purpose of this paper is:

- to detect the learning benefits of Web 2.0 educational activities when applied in pragmatic learning settings and as perceived by the pioneer educators;
- to identify the preconditions for realizing successful Web 2.0 educational activities; and
- to specify the difficulties faced by educators when integrating Web 2.0 activities in their teaching.

To provide answers to these three questions, we collected and analyzed the testimonies of 26 Greek primary and secondary education teachers who have demonstrated the most extensive and creative involvement with Web 2.0 tools and activities in their classrooms.

2. Literature review

As already mentioned, there is a rather rich body of research reporting that the introduction of Web 2.0 in teaching has significant potential to support and enhance students' overall learning (Ajjan and Hartshorne, 2008; McLoughlin and Lee, 2010). Important pedagogical goals seem to be realized easier. For example, Web 2.0 activities promote the interconnection of students and teachers, as they increase the number of student–faculty and student–student interactions (Yuen *et al.*, 2011; Liou and Peng, 2009; Ajjan and Hartshorne, 2008), empower the sense of being member of a learning community (Yuen *et al.*, 2011) and enhance the quality of the collaboration (Yuen *et al.*,

2011; Crook *et al.*, 2008a). Additionally, Web 2.0 stimulates new modes of enquiry, knowledge creation and sharing (Crook *et al.*, 2008a; Yuen *et al.*, 2011) and drives the familiarization with new literacies (Choi, 2009; Crook *et al.*, 2008b). Even new theories of learning, such as connectivism (Siemens, 2005), have emerged and are based on the premises of Web 2.0. Interestingly, there are also positive psychological effects, as Web 2.0 seems to promote the enhancement of learners' engagement, confidence, autonomy and motivation (Chen, 2009; Crook *et al.*, 2008a; Kessler and Bikowski, 2010) and the development of a sense of ownership (Harrison and Thomas, 2009; Crook *et al.*, 2008a). And, finally, and most importantly, all these result in the production of quality work (Crook *et al.*, 2008a).

Research suggests that teachers' intention to use and the actual use of Web 2.0 technologies are strongly influenced both by their attitude and personal beliefs concerning the way students learn (Ajjan and Hartshorne, 2008) and by their familiarity with the available technologies (Crook *et al.*, 2008a). More specifically, Ertmer *et al.* (2012) found that "teachers' own beliefs and attitudes about the relevance of technology to students' learning were perceived as having the biggest impact on their success". Additionally, internal factors (e.g. passion for technology, having a problem-solving mentality) and support from others (administrators and personal learning networks) had a significant impact on their practices. Kim *et al.* (2013) also concluded that teachers' beliefs about the nature of knowledge and learning (epistemology), effective ways of teaching (conceptions) and technology integration were positively correlated with one another.

However, teachers' positive attitude toward the educational value of Web 2.0 learning activities should not be taken for granted, as a rather significant number of teachers are unsure about the opportunities presented by Web 2.0 (Crook *et al.*, 2008a). There are numerous studies which enumerate many barriers and challenges that teachers face during their effort to adopt Web 2.0 tools into their teaching practices. Many challenges have common roots with the challenges of integrating information and communications technology in education in general. Ertmer (1999) presented such barriers and discerned them in two main categories: the external barriers, which are access to technology, time, training and support, and the internal barriers, which concern teachers' fundamental beliefs about teacher–student roles, curricular emphases and assessment practices. Hew and Brush (2007) organized the difficulties that teachers confront in six categories: resources, knowledge and skills, institution, attitudes and beliefs, assessment and subject culture. Gado *et al.* (2006) also indicated as causes of problems, the classroom and school culture.

Crook *et al.* (2008b) identified numerous barriers concerning specifically Web 2.0 integration in schools, such as the time-consuming character of such educational activities, the teachers' inability to control the internet use in class, the tight restrictions and lengthy procedures/protocols by local authorities for using the internet, technical issues, teachers' uncertainty concerning the opportunities that Web 2.0 offers, lack of awareness of legal and copyright issues, students' lack of critical literacy skills and the influence of the assessment system. An and William (2010) also identified barriers such as student uneasiness with openness, public discourse and interaction, technical difficulties regarding students' lack of new computers, glitches due to the in-progress nature of many Web 2.0 tools, lack of adequate technical support and the time-consuming process to learn and manage new Web 2.0 technologies. Recently,

Ertmer *et al.* (2012) supported that the external barriers to teachers' technology integration practices such as training, support, hardware and internet access have been reduced. Interestingly, educators indicated that their own beliefs as well as internal factors (passion for technology, having a problem-solving mentality) and support from others (administrators and personal learning networks) had the greatest importance concerning the success of their practices.

Hence, while there are several cases in which Web 2.0 was integrated in the classroom and offered significant learning benefits, there are also barriers and prerequisites for the teachers that have to be addressed to take advantage of its premises.

3. The study

This exploratory study focuses on revealing the views of teachers who succeeded repeatedly in applying Web 2.0 educational activities in their classrooms, have overcome more than once the related difficulties and are considered as pioneers in their community. These instructors can offer us more valid and significant empirical insights about the various aspects of Web 2.0 in education, they have already identified issues and opportunities due to their extensive experience with a variety of corresponding learning activities and different contexts in which they take place and they can also provide views that go well beyond the practicalities of integrating Web 2.0 in the classroom.

Hence, the participants of our study were selected using a purposeful sampling strategy (Patton, 2002). It was substantial to include into our sample, the most experienced teachers with Web 2.0 educational activities in Greece. To achieve that, our first step was to search extensively on the internet for Greek teachers who:

- shared the most creative Web 2.0 instructional practices through social channels (blog, twitter, Facebook, forums); and
- demonstrated extensive social presence with large networks of readers and followers.

We identified a list of 60 potential teachers, which was later ranked according to the content of the teachers' posts (relevance with creative Web 2.0 activities in the classroom) and the extent of their social network (numbers of friends, followers and following). We considered that the pioneer teachers should have published the most Web 2.0 instructional approaches, should be recognized by their colleagues and should exploit actively Web 2.0 for their professional development.

Email invitations were sent to the first 35 teachers of the list, asking them to participate in an interview via Skype. In all, 26 teachers agreed to participate, 16 men and 10 women. Thirteen participants were teachers in secondary education (five in computer science, four in physics, two in mathematics, one in foreign languages and one in theology), 11 were teachers in primary education and two were instructors in foreign-language schools.

The 26 interviews were semi-structured, lasted on average about 40 min and were recorded. The interview questions were structured around to the following themes:

- best personal case studies of exploiting Web 2.0 in a classroom (e.g. How did you integrate Web 2.0 tools in your classroom? Can you describe relevant educational activities? Which were the most effective case studies?);

- students' views of Web 2.0 in the classroom (e.g. How did your student react to your instructional approach?);
- problems and prerequisites (e.g. Which were the most significant problems you confronted? Did you have any concerns about the effectiveness of your approaches?);
- educational opportunities with Web 2.0 (e.g. Which are the educational problems that you address with Web 2.0?); and
- professional use of Web 2.0 (e.g. Which Web 2.0 tools do you use daily? How do these tools help you develop your practices?).

The questions were designed so as to extract teachers' experiences, attitudes, problems and suggestions for the integration of Web 2.0 learning activities into the school life. However, additional questions were added, as needed, to take advantage of specific comments made by the participants. Our main aim was to allow teachers to explain their experience in their own words without prompting about specific Web 2.0 tools or activities.

All audio-recorded interviews were transcribed and then encoded and compared within and between cases using a QDA software and the constant comparative method (Glaser and Strauss, 1967). Major structures, shared values, key justifications and central relations were identified separately by three researchers who had extensive experience with Web 2.0 literature. Afterwards, the three researchers collaborated to reach consensus for the commonly identified issues. Finally, all codes were iteratively regrouped, aggregated and redefined to address the research questions under examination and to contextualize the results with the findings of relevant studies.

4. Findings

4.1 Teachers' experience

The teachers in our sample had used an impressive variety of Web 2.0 tools and Web 2.0 educational activities for both their teaching practice and their professional development: blogs (e.g. Blogger, WordPress), social networks (e.g. Facebook, LinkedIn, Classroom 2.0, Teachers 2.0), micro-blogs (e.g. Twitter, Edmodo. etc.), presentation tools (e.g. Slideshare, Creezy, Stich, Prezi, MyPlick), social bookmarking services (e.g. Diigo, Delicious), online calendars (e.g. Google Calendar), RSS readers (e.g. Feedly), interactive timelines (e.g. Dipity, Timeline), cloud storage (e.g. Dropbox), collaborative authoring tools (e.g. Wikis, Google Docs), website creation tools (e.g. Wembley, Webnode), multimedia tools (e.g. Animoto, Sumopaint, Creezy, OneTrueMedia), image sharing services (e.g. Picasa, Flickr), word clouds (e.g. Wordle), interactive posters (e.g. Glogster), podcasting tools, comic creation tools (e.g. Toondoo), online quiz tools (e.g. Hot Potatoes, Zoho Challenge, Quizmaker), electronic interactive boards (e.g. Wallwisher), etc.

Teachers also demonstrated the development of a variety of Web 2.0 activities, including, among others, the creation of an online TV blog by primary school students who lived in an isolated area of the country, using blogs for practicing writing skills in English and motivating students to communicate with peers from other countries, using blogs to provide students with the opportunity to express their views on school issues and to publish their work, using Facebook games to improve written language and mathematics skills, creating podcasts for monitoring

the progress of students, using wikis for collaborative document writing, creating web pages on social networks (Facebook) for organizing class activities, using collaborative concept mapping tools for evaluating students' understanding, using social bookmarking applications for sharing information about lesson's activities, using word clouds for teaching grammar and synonyms, creating interactive posters to enhance creativity and writing skills, etc.

Teachers had built social networks that exceeded the national borders and they were well-informed for most interesting Web 2.0 initiatives throughout the world. All these data indicated that the sample met the selection criteria defined in the beginning of our study.

4.2 Benefits of Web 2.0 in learning

Teachers were positive in their assessment of the impact of Web 2.0 educational activities to their students' learning and identified a number of ways in which the learning practices and results were improved.

4.2.1 Students are more active and motivated. According to the participants, the use of Web 2.0 technologies enabled the design and the realization of activities that motivated students. The degree of the students' commitment and involvement increased, as most participatory learning activities trigger students' interest and participation. Several teachers mentioned that students learned by adopting the role of the researcher and managed to navigate better through the wealth of information on the internet:

> Students are really actively involved, they enjoy it, it is something different and something they often ask for. Rather than being passive recipients, they are activated and enjoy participating. I6 (male)

> [children] are motivated, their interest is greater and also you can be surprised by children who were never interested at all about physics, and have never spoken in the classroom […] they learn with another way and you can see that they enjoy this kind of game. I4 (male)

> The students were excited; they felt that they were the researchers. I12 (female)

4.2.2 Students create and express themselves. According to the respondents, the introduction of Web 2.0 technologies provides students with the opportunity to create their own digital content, and to play the role of the knowledge producer:

> we have to help students – except from being consumers – to also become creators and co-creators along with the teacher […] It is different to share your project with all the other students and with many others in general through a blog for example. I2 (male)

This is of special importance to today's students, as they are in danger of being limited in only consuming the vast variety of available resources. Web 2.0 activities help students to create and share their own projects and also understand the value of creation and contribution. Additionally, they enhance learners' confidence and self-esteem, characteristics that are not well-supported by previous educational practices:

> The effort of our blog TV is definitely a significant experience for the students, it has increased their confidence. I9 (male)

> On the blog, students do not hesitate to publish their opinion about important issues. Students had time to sit down and think […]. I13 (female)

4.2.3 Students interact with society. Many teachers pointed out that the "openness" of Web 2.0 is one of its most positive features because it makes learning more extroverted and social. Students are asked to combine, synthesize and create content and present it to a worldwide audience. But they also invite the public to give them feedback, to comment and to reuse their material. Web 2.0 educational activities can function as socialization and interaction opportunities with people outside the school. Students have the opportunity to get in touch with people with different social and cultural characteristics, to cultivate their empathy and as a result not to feel isolated or excluded at their local communities:

> Children loved the process of publishing their work and activities […]. They had the opportunity to show their work to their family and friends, to communicate and to interact with other people through comments and impressions about their activities. I10 (female)

> […] they wanted their work to be good and to be published so that they can show it to their relatives and friends. I12 (female)

> It also provided socialization opportunities with other schools. This effort enabled our school to be connected with other schools […]. Students of other schools sent messages about what they liked and what they wanted […]. In short, it brought the village closer to the city. I9 (male)

4.2.4 Students learn to collaborate. According to teachers' testimonies, the organization of Web 2.0 activities may also support the development of collaboration skills. In Web 2.0 activities, students are forced to coordinate their actions to achieve their goals; they use tools which are designed to support transparent cooperation and allow children with similar ideas to collaboratively build on each other's work. In such settings, it is inevitable to realize that the quality of their personal work and effort can affect the overall project of a class and, as a result, they re-consider the value of responsibility and usually try more:

> In a conventional classroom, it is hard to teach children how to cooperate, to act like a group. The use of Web 2.0 tools is pleasant and offers effective solutions that conventional means cannot provide. I11 (male)

> I noticed that the children felt like participating in a team effort […] and put more effort to do their own part of the job as well as they could, in order to be appraised by the others and to contribute positively to the group effort. I9 (male)

> I also noticed that students began to coordinate and collaborate as a team […] even if the groups were heterogeneous, they worked well together and there weren't any problems. I13 (male)

4.2.5 Learning activities continue beyond school. Web 2.0 activities seem to create a new time-space for communicating, interacting and collaborating. The educational dialogue continues after school through social media. Teachers may provide relevant material or students can discuss, comment and present their work. Therefore, the learning dialogue can last more and be enriched with more subjects:

> […] I can tell you that when I published math applets, videos for equations or the song of a function, a day before the test, that was very helpful […]. I also published on my blog the

> history of mathematics, since I did not have the time to discuss it in the classroom, it attracted students' interest and finally the discussion continued in the classroom. I3 (female)

> […] there is a supportive e-space, where there is continuous communication, cooperation and answering of students' questions. I15 (male)

4.2.6 Students have time to reflect. Teachers argued that Web 2.0 educational activities give students the opportunity to elaborate more on their views and thoughts before they actually express them. Such a possibility was not feasible in the classroom:

> The students had time to sit down, think and reflect in order to write an essay, an action that it's beneficial when it happens. It is not always possible for students to participate in conversations that take place in the classroom. Perhaps, they are too shy to talk in class. I believe that in such environments those students blossom, when they are at home, they have the time to express themselves, something that we don't see very often in the classroom. In other words, the quite students surprised us through the blogs. I13 (female)

Many teachers noted a positive change on the motivation and participation of students who were displaying an indifferent attitude toward the traditional teaching methods before. They supported that the mediation of Web 2.0 tools empowers the participation of the more quiet students who, in their own space and time, can surprise everyone with the change of their attitude and their contribution:

> […] there was an interest by very weak students, by students who were showing no interest. For example, one girl did not even want to come to school […] she was the first who wanted to participate and really did very well and I think she acquired all the knowledge concerning the issues we had dealt with. I24 (male)

> All these practices and tools help me organize and make the lesson more appealing to students and also get the shy students more involved. If these students have the opportunity to express themselves in their own personal time and place, they will probably surprise you. I1 (male)

4.2.7 The students feel closer to their teachers. The teachers noted that the use of Web 2.0 tools in the classroom helped diminish the digital gap between them and their students. A relationship of trust is being developed, as the teacher shows his students that he tries to come closer to their desires and their electronic practices. On the other hand, students feel easy to share their thoughts about the field of electronic social conduct with their teachers:

> The reactions of my students are positive, too. They understand that you are well informed, that you can understand them and keep pace with them. I3 (female)

> They like the idea that their teacher can use these tools. They feel close to him […]. When they see a teacher who says, "These are tools of the devil", instinctively move away from him, because they wonder how can the tool, that I use myself everyday, be evil? I23 (male)

4.3 Preconditions for successful Web 2.0 educational activities

The overwhelming majority of teachers indicated that using Web 2.0 tools alone is not sufficient for achieving successful teaching, but their affordances provide an opportunity for better learning results:

> Web 2.0 tools give to the instructional plans an economy of space, a particular aesthetic, and they are challenging tools in the disposal of an educator for achieving his instructional goals […]. I26 (female)

All educators emphasized strongly that Web 2.0 apps are not a panacea. The participants did not exaggerate on the value of the Web 2.0 and stressed that the crucial question is how someone can incorporate organically the evolution of technology into his/her everyday life and teaching:

> The use of such tools can improve the classroom practice. But it is not a panacea, which means that Web 2.0 tools can't solve all kind of problems. I18 (male)

> Every teacher must first understand his students' needs and abilities and afterwards should define the educational objectives of each learning activity. Then, the appropriate tools should be selected for the fulfillment of the specific goals he previously set. I6 (male)

> I do not use Web 2.0 tools throughout my lessons, but only when I think that they serve the educational goals. I11 (male)

Teachers argued that, although the use of new technologies attracts the students' interest and engages them to a greater extent, this enthusiasm is often transitory. To maintain the students' interest, it is important to choose activities which interest them and offer opportunities to express themselves and design and develop useful products. Some teachers suggested that the learning activities must be less theoretical and more problem-oriented, because in this way, they attract students' interest to a greater degree:

> Usually the first times students use Web 2.0 tools in the classroom, they get excited. But when the use of the new technologies becomes more frequent, this excitement vanishes […] it is important to clarify that the technological tools do not make the lesson more fun or motivate learning. The selection of the educational activities is of more importance. The educational activities should be related to the children's interests and give them the opportunity to express themselves freely and creatively. I11 (male)

> The children were thrilled, because anything new excites them. But that must be done for a purpose, else, 5 minutes later, they will get bored. I22 (male)

They also mentioned that young teachers, who do not have the appropriate experience, tend to exaggerate in the use of new technologies. They argued that they should always consider critically how and when to integrate tools in their teaching, because the technology magnifies the final positive or negative educational outcomes:

> The most important role is played by the teacher and how he will organize the lesson activities in order to make them interesting and meaningful for the students. In fact, many teachers in the early years of their teaching career use quite often new technologies, giving them a surplus value – a mistake I did too – but over the years they begin to think more critically and use them more carefully and only in cases they are beneficial to their teaching. I11 (male)

> The same applies to the use of Web 2.0 tools, with the only difference that the use of technology maximizes the final educational outcomes, either negative ones or positive ones. Indeed, the risk I identified is that technology magnifies the learning initiatives and the final results as well. I12 (female)

Finally, the teachers acknowledged that they were obliged to transform their own role in the learning process. The Web 2.0 activities signify the reversal of the traditional instructional model of knowledge transfer, as the teacher must place the student in the center of the learning process and she should adopt a more supporting role to the peripheral of the learning process:

> What I want to do is to abandon the process of disseminating knowledge while students watch me […]. Probably, students, who are now in elementary school, will be more familiar with this kind of teaching-learning in the future. I5 (male)

> Students like that, there is a hidden teacher behind the learning process, but they do not like him to constantly intervene and guide them. I23 (male)

4.4 Challenges

The positive outcomes of Web 2.0 learning activities are not easily achieved. The pioneer teachers confronted a lot of problems in their effort for applying Web 2.0 practices in their classrooms.

4.4.1 The colleague teachers' attitude. Unexpectedly, one of the most commonly identified difficulties was the attitude of fellow teachers toward the use of technology in the educational process. It was stated that several teachers fear Web 2.0 activities and have a negative attitude toward the incorporation of computers in the classroom and even more toward social networking. The interviewees claimed that teachers may be suspicious over the intentions of the educators who incorporate Web 2.0 activities in their classrooms. As a result of their doubts, these teachers do not support their colleagues' efforts and may even attempt to impose barriers. However, many Web 2.0 activities often concern people and things that go beyond the boundaries of a classroom or a lesson, and therefore require the cooperation of teachers:

> I realize every day that the biggest obstacle is the teachers themselves. They do not like lessons being conducted like that in another classroom. I22 (male)

> I wanted to create my school's blog but I met strong opposition from my colleagues. They could not understand the philosophy of the blog, although I explained it simply and without trying to hide anything. The whole reaction was basically concentrated on the blog's management and power control issues. I3 (female)

The culture of participation, sharing and collaboration is not widespread among teachers and those elements are prerequisites for the creation of communities, the cultivation of the collective intelligence and the participatory Web:

> [The teacher] is somehow isolated […] He can be very good at his job, but keeps everything to himself. He doesn't share easily his views because he is afraid of being exposed. In other words, the Greek educator doesn't have the culture of collaboration […]. [The teacher] has to understand that we must be all together on this, moving toward one goal: to improve our education, the students' education. I22 (male)

4.4.2 The principal's effect. Teachers' testimonies revealed that the required freedom for designing innovative Web 2.0 activities is not favored by the power structures of the formal educational system. There is excessive control and lack of trust in teachers. Many emphasized that the school's principal role is crucial for each new effort, and usually the principals tend to be reserved for activities related to the participatory Web:

> At first, I mostly confronted problems with the principal who wanted to get permission from the educational institute and generally was not on board with the idea. I3 (female)

> […] there are always problems and I have always to report to the principal, why and how this happened etc. I23 (male)

4.4.3 The parents' attitude. The new public sphere of students' interactions is also a source of worries for parents and, often, they are reluctant to give consent to Web 2.0 activities due to the possible exposure of their children and the dangers that they pose. Parents are not well-informed and do not know how to guide and control their children's Web activity:

> The biggest problem was with parents who worried about the potential exposure of their children on the internet and I had to explain them the whole process […] the students could not participate without parental consent […] they feared a little, but then, when they saw the results and the enthusiasm of the students, they changed their mind. I9 (male)

> I faced problems with several parents, who were negative toward the use of the internet, each for his/her own reasons. I22 (male)

4.4.4 Incompatibility with the curriculum and the assessment system. Another difficulty identified is the indirect relationship between Web 2.0 activities and the objectives of the curriculum. The specifications and the aims of the curriculum are precise and clear, the conformity expectations are high, time is limited and all these result in the limitation of opportunities for creative instructional practices. Web 2.0 activities usually involve project-based work, having as a main goal to develop general skills useful for solving problems:

> [The educational system] requires a high level of conformity to certain methods and curricula, and this leaves no space for creativity and the necessary freedom that is needed for revealing the most meaningful parts of the lesson. I4 (male)

> The system doesn't want experiments and doesn't support such efforts. There isn't any freedom for the educational process, as the curriculum and its instructions create several limitations. I9 (male)

The nature of the Web 2.0 activities also challenges the installed practices for assessing students' performance:

> Once the students finished their project, we discussed how we could evaluate if they had learned history. It was not possible with the conventional way. I22 (male)

4.4.5 Preparations and the life span of the activities. The participatory Web creates a new challenge for educators regarding their time management, as they have to cope with continuous interactions inside and outside the classroom. The Web 2.0 activities usually do not conform to the traditional character of one-hour lessons, as they exceed the weekly homework, and, many times, the context of the classroom, or the school, or even the country. The interaction with the students is transferred throughout the day, as projects continue in the afternoon and questions, problems and proposals are submitted in a continuous manner, changing the role and usefulness of hourly teaching. Additionally, even teachers who are technologically competent are concerned about the time required to plan such activities:

> This model (of incorporating Web 2.0 activities in the classroom) has more requirements for the teachers, it requires significant after school hours interaction. I26 (female)

> During the year there isn't the luxury of time to organize and complete the activities. I20 (male)

Teachers noted that dealing with Web 2.0 requires a continuous monitoring of technology updates and instructional approaches. New Web 2.0 tools appear frequently, while more sophisticated instructional approaches are proposed as experience is accumulated. Teachers paid special attention to personal learning networks and the need to maintain them, but they could hardly find the time to offer, share and discuss their experiences:

> In such issues training doesn't help too much, instead what helps is the attitude of the teacher who should always try to be informed. I6 (male)

> Each of us creates a personal learning environment where we learn the latest developments by the experts of our field, but also can ask for help or a second opinion on an issue. I1 (male)

4.4.6 Unpredicted outcomes. Web 2.0 activities link students to the real world and provide them with great opportunities, but at the same time, they open a window which can "import" problems of the outside world inside the classroom. Even after proper preparation, the teacher may have to address contingencies during the lesson:

> we have an open window to the world and one small mistake can bring in the classroom images that I wouldn't want to. It has happened to me. […]. I25 (female)

> There are various issues which can create a problem (when you are online) […] when you don't expect them and as a result they disrupt the lesson, it has happened sometimes. I26 (female)

4.4.7 The fear of exposure toward students. Teachers noted that they may have to address a reversal of the typical knowledge balance between them and their students. Now, it is very possible that they will know less than their students concerning the use of the Web 2.0 tools. Hence, in such occasions, they should give up the role of the expert. For several teachers, this is perceived as incompetence and functions as a discouraging factor for initiating Web 2.0 activities:

> I felt like a student who was attending his teacher […] For the student it was absolutely normal. I1 (male)

> Teachers should not fear that their students may know more than them. I5 (male)

4.4.8 The "digital generation" is not so ready! Most teachers agreed that students' skills are limited to the use of social networking sites, communication tools and digital media (photography, mobile phones, etc.) and highlighted that the majority of students do not use technology for expressing themselves, or for creativity and learning reasons. Also, they stressed that students have no sense of the risks involved and they often suffer from common internet "diseases" (e.g. distraction, addiction):

> The percentage of children who are sufficiently familiar with technology is small […] I could say that although we use the term digital generation, in fact, there is digital illiteracy and a time lag. I4 (male)

> The children are now victims of technology, they don't have the sense of limits. I3 (female)

According to the respondents, students often object when they are asked to exploit new Web 2.0 tools, while they do not have adequate skills for cooperation and coordination. Moreover, they are not ready to manage the fast flow of ideas and information:

> They are not mature enough […] how can a child have access to everything […] how much time do they need? It's a deluge of information for them. I3 (female)

> […] it' s too difficult to make them organize themselves and cooperate, although it seems easy […]. We had an incident during a collaborative activity where there was a fight among students, which provoked the parents' protests […]. I18 (male)

> There wasn't a positive reaction when we tried to use a wiki, as they realized that they should write their own texts and not copy others. I20 (male)

4.4.9 Technological problems. In most Greek schools, there is only one computer laboratory, due to shortage of financial resources and high license prices. As a result, a complex coordination problem concerning the laboratory's utilization and maintenance was mentioned several times.

> […] there are technical difficulties that discourage the introduction of new tools in the classroom […] the computer lab is not always available and I have to make arrangements with the corresponding teacher in order to use it. I5 (male)

In addition, computers in schools are outdated compared to those that students have at home, so the experience for them is frustrating. Moreover, the existence of internet connectivity problems can radically and unexpectedly interrupt the instructional plans:

> You cannot talk about Web 2.0 tools when you don't have adequate internet access or when computers are outdated […]. Students are also reluctant because they want to do things but they cannot. I15 (male)

> A problem was the lack of infrastructure. We had 8 computers but they were not enough for 14 students […] they were forced to work in pairs. I5 (male)

4.4.10 Lack of mentoring and training opportunities. The teachers highlighted many times the lack of training opportunities and programs and the absence of adequate instructional material relating to Web 2.0. Teachers considered as very demanding the process of familiarizing with Web 2.0 technology and pedagogy without support. Without appropriate guidance, or properly prepared instructional plans and creative activities, they lost time, sometimes got frustrated or even gave up their efforts.

> Teachers are not supported and training is not sufficient. I15 (male)

> […] there are plenty of tools that are constantly evolving and the teachers don't know how to integrate them in the educational process. Nobody helps them. I6 (male)

5. Conclusions

As shown in Table I, the pioneer Greek teachers who participated in this study agreed that the adoption of Web 2.0 is without doubt beneficial for learning. Our findings about the motivational effects on students, the opportunities for creating products and communicating their efforts, the new time-space of interactions and the relationship with their teachers are consistent with what other educators have reported regarding the

educational potentials of Web 2.0 tools (Allsop, 2011; Crook *et al.*, 2008a; Jimoyiannis *et al.*, 2013; Hramiak and Boulton, 2013 Murphy and Lebans, 2008; An and Williams, 2010; Kist *et al.*, 2010). All these characteristics can function as determinative triggers of effective learning.

On the other hand, the respondents also mentioned several barriers that they had to overcome, such as the negative attitude of their fellow teachers and school authorities, the suspicions and fears of the parents, the incompatibility of Web 2.0 activities with the curriculum goals and the formal assessment system, the unpredictable character of the activities, the fact that the majority of students do not exploit the technology creatively but know in several occasions more than their teachers and the amount of time and effort required to design and implement Web 2.0 educational activities. Some of these challenges have also been mentioned in literature (Crook *et al.*, 2008a; Murphy and Lebans, 2008; An and Williams, 2010; Kist *et al.*, 2010; Jang *et al.*, 2008; Jouneau-Sion and Sanchez, 2011; Jouneau-Sion and Sanchez, 2012; Kale and Goh, 2014; Jimoyiannis *et al.*, 2013).

It is of special importance that the participants did not exaggerate on the value of the Web 2.0 and stressed that the crucial question is how someone can incorporate organically the evolution of technology into his/her everyday life and teaching (Hramiak and Boulton, 2013; Kale and Goh, 2014). The teachers supported that the technology used in the classroom should be goal-oriented, not just for the sake of the technology (Hew and Cheung, 2013; Olson and Clough, 2001), and also claimed that they should design carefully their educational activities (Kiyici, 2010). Pioneer teachers are more pragmatic, know how to solve their problems and are passionate enough for preparing and managing the unpredicted outcomes of innovative activities in the classroom. However, the same set of problems can become an insurmountable wall for all other teachers.

Our study indicates a lot of issues that can be addressed, to facilitate the integration of Web 2.0 in the classroom. Teachers tacitly indicated that Web 2.0 does not just enable more effective learning, but it can change dramatically the whole education settings, the place, the time, the teaching approaches, the relationships, the results, the connection of students with society and the interrelation between schools and society. Hence, Web 2.0 should not be considered as just another effective mediation tool but as a canvas on which educators and policy makers can investigate more thoroughly once more the ultimate goals of education. However, to become a creative canvas, more structural

Benefits	Obstacles
Students are more active and motivated	The colleague teachers' attitude
Students create and express themselves	The principal's effect
Students interact with society	The parents' attitude
Students learn to collaborate	Incompatibility with the curriculum
Learning activities continue beyond school	Preparations and the life span of the activities
Students have time to reflect	Unpredicted outcomes
The students feel closer to their teachers	The fear of exposure toward students
	The "digital generation" is not yet ready!
	Technological problems
	Lack of mentoring and training opportunities

Table I. Benefits and obstacles for incorporating Web 2.0 in classroom as extracted by Greek pioneer teachers

changes in the educational system are required. An obvious one is that there is a need for more flexible curriculum structures to exploit the all new time-space of the educational activities. For example, long-term projects between classrooms and schools cannot be confined in after-school hours, as they need time, extra effort, coordination and cooperation, and they also need more differentiated learning goals and learning paths. Parents must also be more educated about the learning gains and the side-effects of internet usage for learning, as the multiplicity of interactions will need their informed supervision.

Teachers also need to adapt their role and change their educational practices (Jouneau-Sion and Sanchez, 2012). But this process needs effort, as most teachers are used to acting according to a more instructor-led teaching model (Jimoyiannis *et al.*, 2013). Teachers need to see examples of what this kind of teaching looks like in practice, and they need opportunities to both experiment and succeed. They are asked to shift power to students and be prepared for the unexpected, they are asked to offer flexible requirements and cooperate closely with almost everyone and they are asked to assess their students with new measures and values. As one participant characteristically mentioned: "We had in mind another learning model, but it was successful for other times, maybe 30 years ago. These things cannot be in use after 30 years. It's tragic". The pioneer teachers underlined that all these challenges should not discourage their colleagues and, instead, they should deal with them as opportunities for improving and enjoying their work.

Do educational departments prepare the future teachers with this mindset as a target? Have the universities themselves managed to get acquainted with these instructional practices? As there is always the danger that the character of teaching may become disconnected from the real needs of the young people (Cachia *et al.*, 2010), similar studies with experienced and innovative teachers are needed to reveal empirically the benefits, prerequisites and barriers of new technologies and to connect theory and practice. The results of such surveys can be easily transformed to sets of critical guidelines for policy makers and for educating the educators.

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