Anagramming PLE: Empowering Professional Learning through microblogging

Gabriela Grosseck, West University of Timisoara/Romania –
ggrosseck@socio.uvt.ro
Carmen Holotescu, Politehnica University; Timsoft / Romania – cami@timsoft.ro

Abstract

Although since 2004, when the term PLE was coined by JISC and Scott Wilson, a whole literature and projects around PLE are being created, a relatively small number of studies and research integrate the microblogging technology. In this context our paper focuses on how the PLE can be built, modeled and conceptualized on a microblogging platform, as a result of an exploratory study carried out by the authors on the platform Cirip.eu, during the last two years.

Cirip.eu, a microblogging platform specially designed for education, integrates a wide range of Web 2.0 applications and social networks organized around educational resources in order to encourage teachers and students to discover and use them. Furthermore Cirip allows the creation of a personal profile / portfolio including ideas, projects, research, information resources, multimedia objects created individually or collaboratively. All users' activities are developed in a dynamic and complex manner following a continuous evaluation process by communicating with other members. Thus on Cirip each microblogger can build not only a Personal Learning Environment but also a Personal Learning Network (PLE / PLN).

The study includes an ongoing group called PLE/PLE Conference Barcelona, opened when the first call of papers for conference in Barcelona was launched. The group gathers messages on PLE posted by members of the platform, also messages imported from Twitter, blogs or other social networks, reflecting the interaction/debate concerning PLE and conference. All notes, seen as learning traces, are carefully analyzed both quantitative and qualitative (statistics, cognitive maps etc.).

Therefore, the group can be considered a time capsule storing messages in 140 characters, being a learning experience and an important documentation in the PLE field. The group offers a fresh and informal image of this domain from the perspective of practitioners worldwide, and also has enabled us to conceptualize PLE / PLN architectures for different learning contexts using microblogging.

At conference we will present real-time analysis of the PLE group, the other participants being seen as co-authors of these results. The group will be used for future sharing and reflection on the PLE field.

1.   Introduction

Although since 2004, when the term Personal Learning Environment (PLE) was coined by JISC and Scott Wilson, a whole literature and projects around PLE and lately Personal Learning Network (PLN) are being created, a relatively small number of studies and research integrate the microblogging technology (Taraghi, Ebner, Till, and Muhlburger, 2009; BECTA, 2009; McNeill, 2010; Elch, 2010).

We have noticed that specialized literature is continuously changing and overcrowded with resources dedicated to PLE or to PLN in various contexts. Some of these are theoretical (Johnson and Liber, 2008) and/or methodological proposals (Ivanova (a), 2009; Ivanova (b), 2009; Taraghi, Ebner and Schaffert, 2009); others address new paradigms or filter the importance and place of each one separately (Ivanova, 2010) or together (Skill, Carhart, Houton and Wheeler, 2010). In some papers, the two concepts are set/put in antagonism, in others they are (re)invented. Regardless of the content, all these resources metamorphose in challenges addressed to e-learning specialists (Waters, 2008-2010) or practitioners (Hart, 2009). The intention is clear: we either give one up and promote the other (The King is Dead, Long Live the King!), or we (re)consider new opportunities (Attwell, 2007), new solutions of using them together in education (Downes, 2010; Buchem, 2010; Attwell, 2010).

From the conceptual and technological point and view, we appreciate that two approaches related to PLE implementation exist:

- mashups by aggregation (Attwell, 2010; Ivanova, 2010, Taraghi, Ebner and Schaffert, 2009); these solutions **seldom consolidate a public profile/portfolio;**

- integrated environment (Harmelen, Metcalfe, Randall, 2009); usually used during a course or a specific learning project, they **don't incorporate the previous PLE, don't have the characteristics of continuity.**

In this context our paper focuses on how the PLE can be built, modeled and conceptualized on a microblogging platform, as a result of an exploratory study carried out by the authors on the platform Cirip.eu, during the last two years.

2.   Facilities of microblogging platform Cirip.eu

In the spring of 2008, under the coordination of the second author, was launched Cirip.eu, a microblogging platform especially designed for education and business. The implementation was realized by Timsoft (http://www.timsoft.ro), a company specialized in eLearning and mobile applications.

Besides the facilities of a microblogging platform (Grosseck and Holotescu, 2010) Cirip.eu provides the following:

- *Specification in the profile of the domain of users' notes.* This simplifies the search for microblogs in a certain domain, particularly in the educational one.

- *Sending and receiving messages* via the web, mobile version, SMS, IM (Yahoo and Jabber), e-mail, Firefox/Chrome extensions, API, desktop and other 3rd party applications, and can be imported from Twitter, RSS (figure 1)*.*

- *Embedding multimedia objects in the notes:* images, video clips, audio and (live) video files, live-streaming, presentations, cognitive visualizations like diagrams or mindmaps etc.

- *Creating public or private user groups.* Collaboration groups can be created between the members of a class or a university year, for a course enhancement or to run an entire online course. Groups have an announcements section (*Group News*), where moderators can post notes and materials such as SCORM/LOM objects, for the group activities.
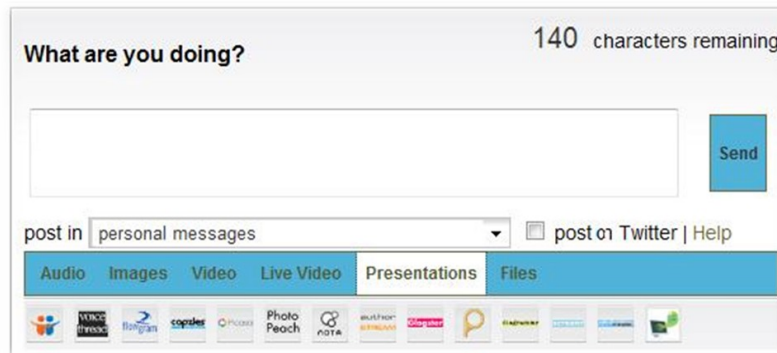
Figure 1 Posting notes on Cirip.eu via web

- *Monitoring RSS feeds* for sites, blogs, or activities on other social networks or search feeds.
- *Tagging* the content
- *Creating and conducting polls and quizzes* (which can be answered online or by SMS).
- *Visualizing statistics and representations of the users/groups interaction* networks.

The interface is in Romanian, English and German, facilitating an international collaboration, around 10% of the 15000 users being foreigners.

Figure 2 highlights the most important features of a microblog created on the platform.

Figure 2: An educational microblog on Cirip.eu

3.   Methodological framework

Because the research field by itself is rather new, to investigate such a topic we turn to explorative type of analysis, meant to provide a first image of the phenomenon.

The *work hypothesis*:

How can a PLE be built, shaped and conceptualized on a microblogging platform?

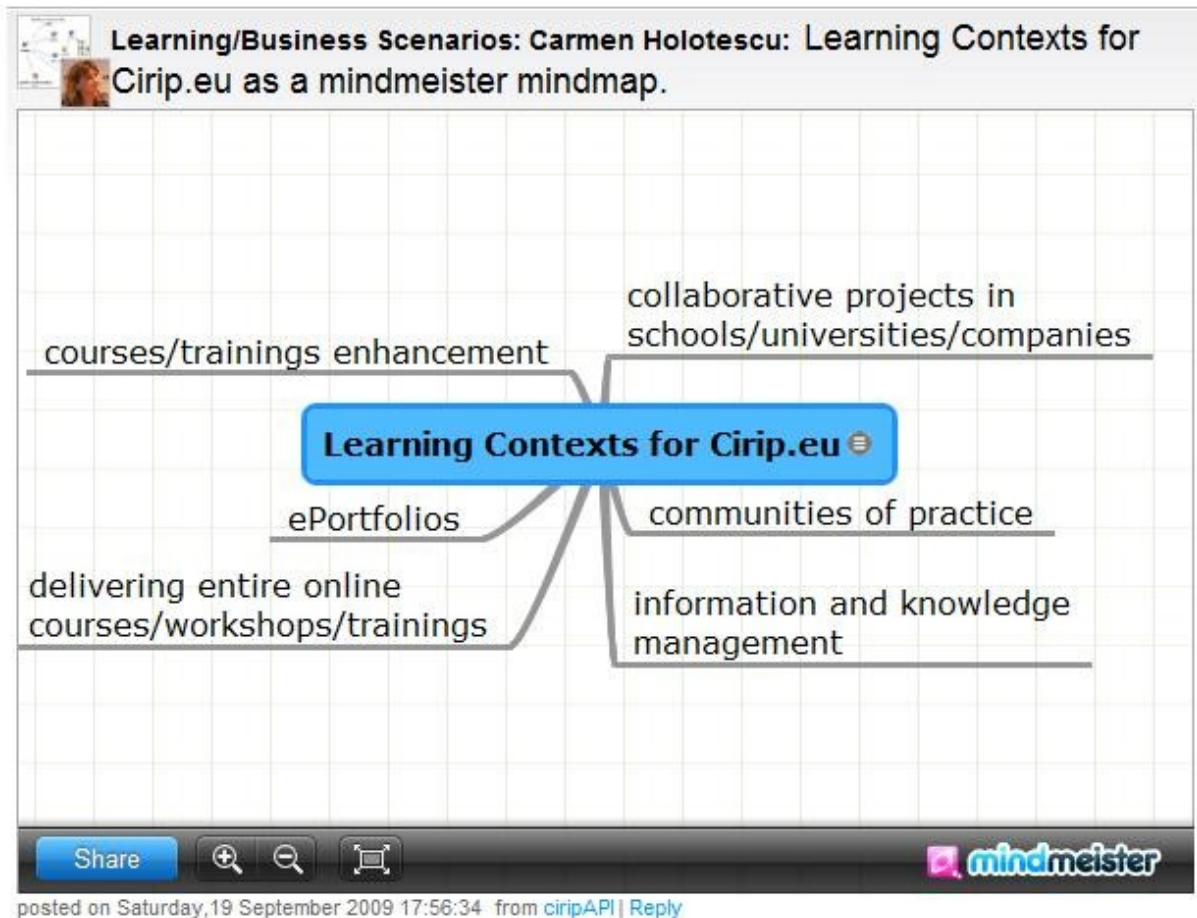*is based* on the learning contexts experienced already on the platform (figure 3)

Figure 3: The most relevant Learning Contexts for Cirip.eu

source: http://www.mindmeister.com/maps/show/13912568

and *was facilitated* by the online project PLE / PLE Conference in Barcelona developed on the microblogging platform Cirip.eu.

3.1   Three-Anagram's Approach to Cirip PLE Framework

On Cirip, we consider a microblog as *a three-dimensional space*: **E**nvironment, **L**earning and **P**ersonal. Following the three dimensions clockwise brings us to the construction of a PLE in three-anagram's approach:

3.1.1 LEP: Learning the Environment Properly

Cirip.eu integrates a wide range of Web2.0 applications and social networks organized around educational resources, many of them in Top 100 Tools for Learning 2009, compiled by Jane Hart from Centre for Learning & Performance Technologies. The Cirip.eu platform featured this top too.

The integration of Web2.0 applications and social networks is realized in order to make them known, to organize and simplify their use, to encourage members (teachers, students and other learners) to discover, to explore, and to practice them; we can say Cirip offers an opening to Open Educational Resources – OERs (figure 4). Sometimes the use of the Cirip platform implies a prior instruction in order to obtain a real efficiency in exploiting all its facilities.

Figure 4: Web 2.0 Tools on Cirip.eu

3.1.2 EPL: Empowering / Enhancement Professional Learning

In 2005 Jyri Engestrom, the co-developer of the Jaiku microblogging platform, launched a theory stating that, in most cases, people base their relations on certain objects, which he named „*social objects*". These can be both physical, such as „location", and semi-physical (such as „attention") or even conceptual, such as *„on-line presence*". According to Engestrom objects become the centre of any social relation and the nucleus/fundamental notions of a (strong) social network.

Thus, it is important to use *web 2.*0 tools / social networking / educational resources not only as **personal web technologies** (McElvaney, Berge, 2009) but *as social objects as well*.

3.1.3 PLE: Personalize onLine Experience

Cirip allows the creation of a personal profile / portfolio including ideas, projects, research, information resources, multimedia objects created individually or collaboratively.

All users' activities are developed in a dynamic manner and follow a continuous evaluation process by communicating with members of the platform and/or within the groups he/she is part.
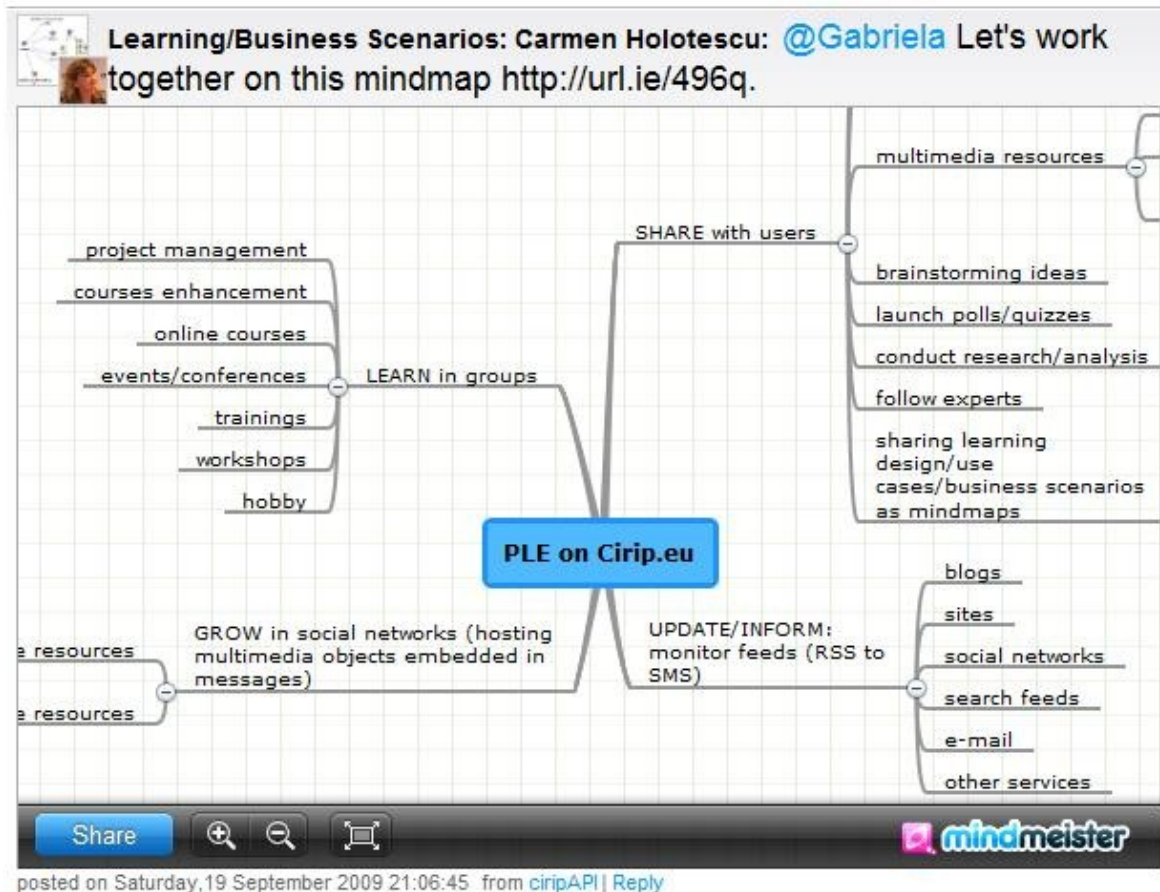
Figure 5 PLE on Cirip.eu
source http://www.Cirip.ro/status/1629920

On Cirip each member **can** build not only a PLE, but also a PLN which can include:

- connection / communication with the followed users;
- the groups they participate in, according to the topics of interest;
- the site/blog/network/search feeds;
- the social networks providing educational objects which can be included in messages.

Thus Cirip.eu can be considered a *social network of PLEs*.

3.2 Group framework analysis

On January 8th, 2010, when the first call of papers for the PLE Conference was launched, the *PLE / PLE Conference in Barcelona* group was open and will remain active until the last echo of this event will fade away.

Figure 6. The first message in group

source: http://www.Cirip.ro/status/2180463?lg=en

The group facilitated by the two authors has as members: teachers, practitioners in education, trainers, students, but also other persons interested in PLE/PLN domains.

The aims of the group were:

- *A source of information/learning* for Cirip members interested in this domain. A part of these members are students participating in the courses run by the 2 authors, who developed collaborative projects related to PLE and who actively participated in this group.
- *Strengthening this domain and new experiments* related to PLE for the authors, one of the results being this article.

Besides the multimedia notes sent by the members, the group gathered also:

- tweets referring to the PLE Conference, imported using the Twitter search API, and
- blogs posts which mention the conference, found by the Twingly search engine API.

This way the group messages reflect the interaction/debate on Cirip.eu and in a worldwide community concerning PLE and the conference.

The content of the group and its information flow on PLE/PLN were enlarged with:
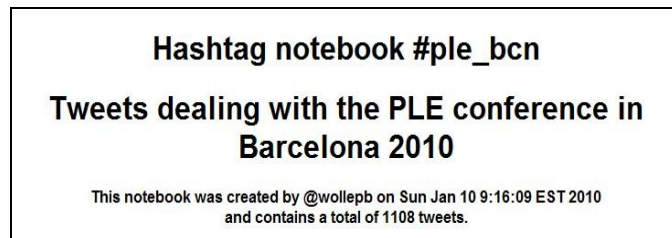
- materials posted by the facilitators in the Announcements section;
- feeds/search feeds on this topic monitored by the group members using the platform corresponding facility; there are delicious.com feeds with ple, pln, ple_bcn tags, also the feed corresponding to the collection built by the group members – tag ple_Cirip (figure 7).

Cirip members had an asymmetric interaction with the imported messages, those who produced them not being members of the platform. Even if an important percentage of tweets had an informal character, many of them enabled the members to be acquainted with the novelties of PLE, to localize resources, to reach the articles, projects and blogs of the top practitioners in this domain.

Figure 7. Feeds monitored online or by SMS by group members

At the moment we started writing this article, the group contained more than 1700 messages, around 1400 being imported from Twitter. For the same period of time, Twapperkeeper collected 1100 tweets containing the #ple_bcn tag.

Hashtag notebook #ple_bcn

Tweets dealing with the PLE conference in Barcelona 2010

This notebook was created by @wollepb on Sun Jan 10 9:16:09 EST 2010 and contains a total of 1108 tweets.

source:
http://twapperkeeper.com/hashtag/ple_bcn

source:
http://www.Cirip.ro/grup/plebcn

Figure 8. PLE messages on Cirip and Twitter

Analyzing the group in terms of **content** (messages, links, embedded multimedia objects etc.), **context** (temporal dimension, location, mobility - widgets, mobile, YM etc.) and **communication-sharing** (@user, RT/RC etc.), we identified three axes of the group dynamics):

- *Community building*: in the group the focus is moved through micro-content from the individual to a web community; every voice counts; the group transforms in a hub through which social interaction is fostered. Major roles play the @user messages, authentication on Cirip using Twitter credentials, and resending (RC/RT on Cirip / on Twitter).

- *Communication backchannel* as a practice to maintain a real-time online conversation alongside other PLE events (during other conferences, workshops, meetings, blog posts, links to articles etc.). Thus, **the messages became learning traces** (Alvarez-González, 2008; Attwell, 2007/2010), like an unofficial communications channel used to make informal learning. Statistics or visualizations produced by the platform, such as Network/ Tagcloud, Wall or polls provide quantitative and qualitative measures for a deep analysis.

Figure 9. Group Tagcloud

- *Distribution* channel *for social objects.* As multimedia objects, in the group we identified conference posters / fliers / caricatures – cartoons / collages in image format, audio/video clips of PLE definitions / remixes, various presentations or documents (slideshare, prezi etc.), livestreaming of students projects presentations, as well as links to articles that had been posted by other users. Because we are dealing with a *Push and Pull* type of content, the interaction created around these objects is the most relevant aspect.

Posts: 1717
Members: 55
Most active: Carmen Holotescu (@cami13) - 63
Least active: Paul (@paul) - 1

Links in messages: 1349

Multimedia objects in messages:
Audio: 23
Images: 156
Video: 112
Live Video: 7
Presentations: 84
Files: 53

Messages sent:
Web: 78
SMS: 54
Mobile: 52
CiripFox: 61
CiripChrome: 7
E-mail:2
CiripAPI: 7
CiripAIR: 2
GoogleGadget: 2
Ubiquity: 33
Twitter: 1405
Blog notes: 23

Group monitoring:
SMS: 12 users
Jabber: 5 users
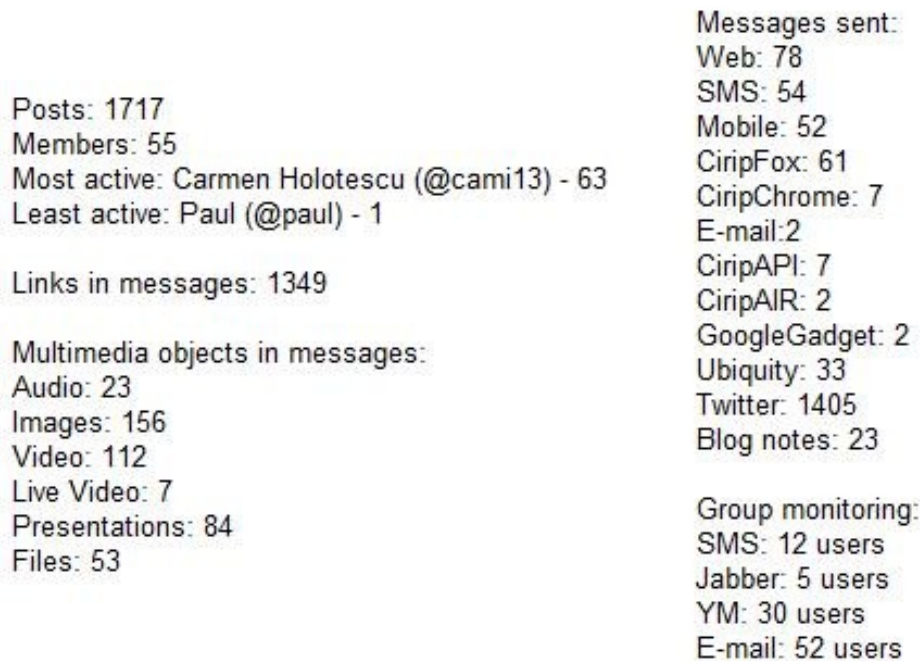YM: 30 users
E-mail: 52 users

Figure 10. Group Statistics

Therefore, the group can be considered not only a **time capsule** of the worldwide practitioners' interaction concerning PLE and the PLE Conference, storing messages in 140 characters, but also a *learning experience*, important in our everyday PLE documentation journey. Moreover, we can speak about a *learning serendipity*, which can conclude in further research projects.

By extending the three axes of the group dynamics:
- from *Personal to People* for the **Community** axis
- from *Environment to a Learning Eco-System* for the **Content/Context** axis, and
- from *Learning to Life Long Learning* for the **Conversation/ Communication/ Collaboration** axis,

we noticed a structure similar to the internal *architecture of the Rubik's cube*, the well known game of logics (see figure 11).
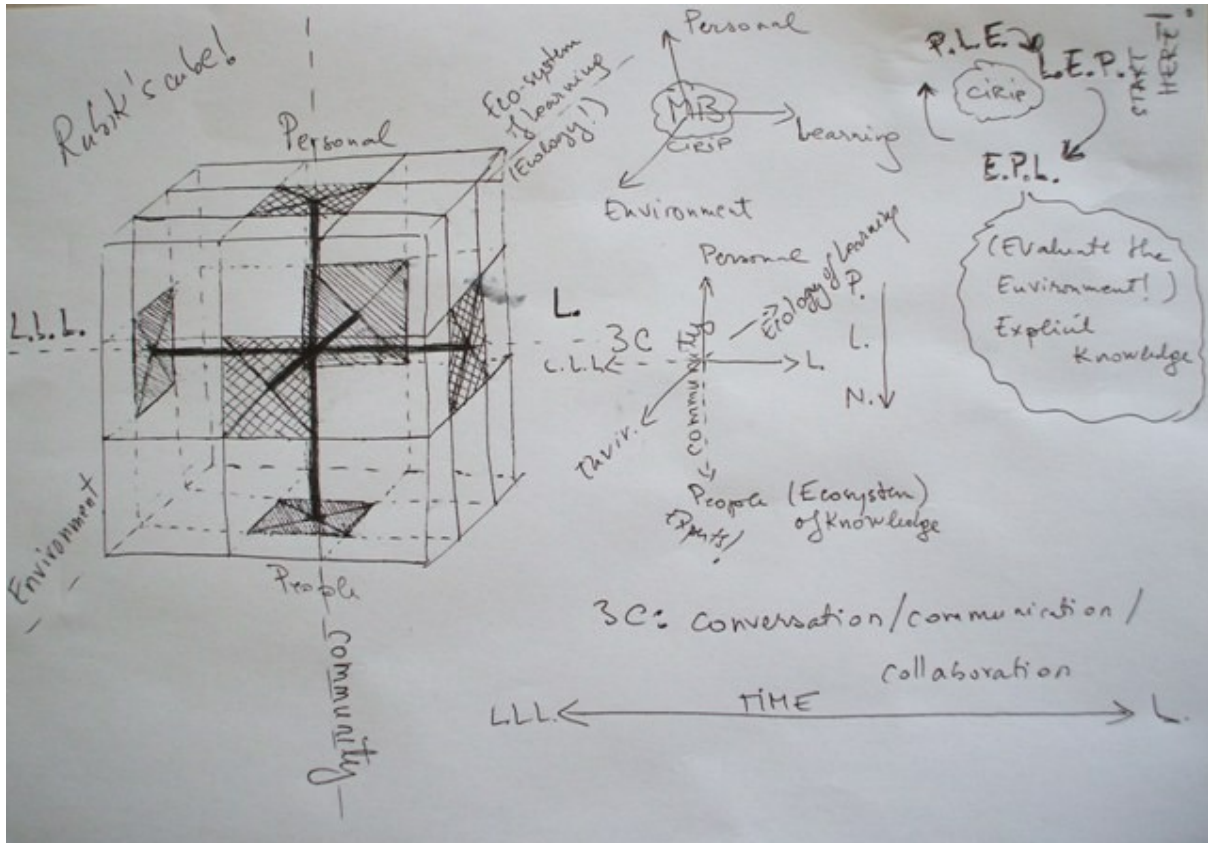
Let's explain (see also figure 11).

Figure 11 Illustration of discussions between the two authors about designing a PLE on the microblogging platform Cirip

3.3. Conceptual framework: the Rubik's cube for construction of PLE on microblogging

Rubik's cube is, first and foremost, an intelligence game, a puzzle game which is extremely easy to learn at any age, and which has enjoyed an unexpected success for almost four decades. It is estimated that approximately one in five persons from around the world has played, at least once, with a Rubik's cube.

Although Rubik's cube raises nostalgia and challenges at any age, we shall not insist on the diverse variants of the famous cube (one more sophisticated than the other), or on its history and / or solving methods. There is enough literature on these topics. The cube has a pivot mechanism that allows the independent rotation of each face, resulting in the mixing of colors. For the puzzle to be solved, each face must be a solid color. We find it fascinating that, although there are billions of possible positions, only a few solutions are valid and the game can be solved in less than 29 moves.

However, what do Rubik's cube and microblogging have in common?

At first sight, we would be tempted to say that they do not have anything in common. Rubik's cube (and its variants) is an apparently simple object which:

- develops creativity;
- is extremely popular;
- constitutes the subject of hundreds of articles and books;
- appeals to all ages and social classes;
- it's a kind of magic;
- it creates emulation and a strong desire in people to solve it;
- it is a game which has constructive value because people produce different, unequal scenarios, the emphasis being on the individuality / uniqueness of participants, thus avoiding sterility in thinking and last, but not least
- it's cool! it's fun!

So is writing in 140 characters!
All of the above are true for writing in 140 characters as well!

4.   Findings Summary or Summarize Findings?
Taking a closer look at the unconventional comparison between Rubik's cube and the most popular Web 2.0 technology of the moment seemed challenging to us first of all in order to elaborate learning scenarios (LS), based on Bloom's taxonomy, and secondly, in order to develop patterns of building a PLE / PLN on the microblogging platform Cirip.

The cube method, as a technique to develop creativity, is not a new idea in literature. Used in teaching in particular, with the aim of exploring a subject or a problematic situation from several perspectives, it allows the **development / creation of competencies, necessary for complex and integrative approaches**. Work can be done individually, in pairs or in small groups. People are required to think, cooperation and team work are stimulated, solidarity and mutual aid are cultivated, social, psychological, behavioral and affective relations are built etc.

The stages of this method correspond to the six faces of a cube, each instruction / requirement bringing about a certain work load, invariable from an action perspective:

- Describe! – explain / define a notion or concept
- Compare! – find similarities and differences
- Explain / Associate! – what does it bring do mind?
- Bring arguments in favor or against – is it good / bad, useful / useless?
- Analyze! –conceptually, from various points of view
- Apply! – how can we apply it practically?

Because the cube method stresses activities and thinking processes involved in acquiring content similar to those presented in Bloom's taxonomy, we shall attempt to apply it in formalizing learning scenarios on the microblogging platform Cirip (Grosseck, Holotescu, 2010).

source:
http://www.Cirip.ro/status/2603456

source:
http://www.Cirip.ro/status/2613591

Figure 12. Digital Bloom's taxonomy on Cirip (left / objects ; right / verbs)

Thus, if we combined the six faces corresponding to a category from Bloom's digital taxonomy for Cirip, in conformity with Rubik's cube, we could easily obtain various types of learning scenarios.

Evidently, there are no rules to generate a **specific type** of LS, but only rules to transform it. The free forms obtained after the respective rotations could be associated with **particular types of LS,** which later on could become part of a more complex and interactive methodological inventory of student-centered learning.

Once the central mechanism is „completed", we can start building the faces on the six „pivots" (we know that Rubik's cube has six faces, which include nine small cubes, forming a total of 9*6=54 small cubes). Although each piece allows a unique combination of colors, not all colors are present. If **we associate a specific Learning Context to each face** - see figure 3, and if we assume that the 27th cube – the central mechanism - represents the PLE microblogging atom / ground zero, we get new formalizations which are born one out of the other. Basically we obtain a cube functioning on *self-nourishment*, which *polishes itself* until it settles into a final / perfect / complete shape – in an IDEAL case.

Hence, similar to Rubik's cube which has to be perpetually rearranged in order to reach its initial state, while designing a (certain) pattern on Cirip, the platform becomes the scene of a heterogeneous negotiation act which varies in techniques and value, as well as in (re)organizing the rules of creating patterns and of deriving some from others. Although a large number of permutations can lead to a complex pattern, the difficulty of formalizing a PLE is conditioned by certain factors of influence, out of which the most significant are the constraints imposed by the moves.

In this context, "borrowing" the basic construction elements of the hexad pattern of pedagogical situations developed by the Romanian researcher Petru Ioan (2005), could provide some formalizations *in building a PLE / PLN on the microblogging platform Cirip.eu,* starting from the classical Rubik's cube.

A hexad usually symbolizes transformation, evolution. By looking at Rubik's cube method from this angle, we can consider it an instrument that tells us in what direction to turn when attempting to formalize a pattern of building a PLE. In this case, **learning in itself**, as the logical sequence in all possible directions, represents the **center of the cube**. Since formalization can be achieved formally or informally, in this paper (in this phase) we can refer only to the constructive, comparative and integrative aspects, derived from Ioan's pattern (a pattern / scenario can lead to another, they can be compared, or certain sequences can be borrowed etc).

We shall not try to conceive a different hexad pattern for all the pedagogical situations in which Web 2.0 technologies integrated by Cirip are present - explicit formalization, this being the case for another paper / research. However a few months ago, the authors have opened a *group of learning design* to create, discuss, analyze, evaluate, improve, adapt, and reuse best practices in using Cirip in education. The conversation is built around learning design objects, which can be considered meta-objects, as they reflect scenarios for different activities on the platform (Holotescu, Grosseck, 2010), mainly for PLE formalization.

5.   Final remarks …
At conference we will present real-time analysis of the PLE group, the other participants being seen as co-authors of these results. In addition, the group will be used for future sharing and reflection on the PLE field.

Because the aim of our research was to make a preliminary evaluation of this new and challenging form of social learning reality, our findings only can lay the foundation for the elaboration of further and more thorough research. However, our explorative study leaded to several positive results. As described in the paper, the proposed methodology could be used not only to conceptualize PLE on microblogging, but also to formalize it:
This is how we think that Rubik's game can help in the creation / construction of a new design instrument: coherent, spatial, simple but at the same time complex, refined, interesting or a loss of time (depending on one's perception of microblogging or of being a microblogger).

6.   Instead of conclusions ...

The PLE Microblogging Alphabet on Cirip (in square brackets are included different web 2.0 tools and applications used on the platform)

> **A=** ambient intimacy (ask for help, arguing, aggregating thoughts) [authorStream / Adobe files]
> **B =** backchannel (blogging / writing in 140 characters, brainstorming) [Blip.fm]
> **C =** connect with friends, collaboration, communication channel (see Grosseck's SlideShare presentation Letter C) [**CIRIP**, capzles]
> **D =** discover, disseminate ideas, discussions [deezer / dotSUB / diagrammr / dipity]
> **E =** explore (providing) experiences, (meeting) experts, exchange opinions, social_echo chamber! [eOK / email]

F = follow the people that matter, fun (enjoyable way to learn), find interesting people/subjects [Flickr (photos/albums]

G = generate, genuinely multi-lingual (write content in any language you want), groups, gather interests, gossips [groups / Glogster]

H = hyperlinking (to support digital media, multimedia objects) [hashtags]

I = information sharing, interactions, (in)formal environment / learning beyond imagination

J = just-in time [Jabber]

K = knowledge, know-how, key-events

L = learning through conversations, liberty of speech/thoughts [LiveVideo / LiveStreaming / Links]

M = microblogging, multimedia, mobile, metacognition, monitoring everything [MyVideo / Mindomo, Mindmeister]

N = (social)networking, news [notaLand]

O = observe, organize/organizational, open(ess), optimism, online [OpenOffice Files]

P = (social) presence, practice C-R skills, private and public, participation [Photopeach/Prezi/Picassa Albums]

Q = query, quizz, questions [quiz/Polls / qIK]

R = resources, researching, reflecting, resolving, record, REAL TIME WEB [RSS feeds]

S = share your thoughts/ideas/feelings, search, surveying, spontaneous, social objects [SlideShare / ScreenR, ScreenCastle, ScreenJelly / Seesmic / SMS]

T = tracking community/ideas/tags, trivia, teamwork, traffic [Twitter / Trilulilu / Twingly / TagCloud]

U = understanding, ubiquitous, up to date, URL [users]

V = voice, vibrating, virus of change [Voicethread / Vocaroo / Vimeo]

W = What's happening?, worth to invest time, will to be involved, the world, the way to connect/interact, to be there [Widgets]

X = xeonophobia, Xanadu of "C" World

Y = Yes You Can! Ying-Yang of social media, year-around [YouTube, Yahoo Messenger]

Z = zirconium of social networking sites

7.   References

Alvarez-González, L. 2008. Learning Traces. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008*. 2509-2516. Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/28712.

Attwell, G. 2007. e-portfolios – the DNA of the Personal Learning Environment. *Journal of e-Learning and Knowledege Society.*

Attwell, G. 2010. Working, learning and playing through Personal Learning Environments. http://www.slideshare.net/GrahamAttwell/working-learning-and-playing-through-personal-learning-environments.

BECTA. March 2009. *Software and internet analysis: Micro-blogging in education*. http://emergingtechnologies.becta.org.uk/index.php?section=etr&catcode=ETRE_0001&rid=14363.

Buchem, I. 2010. Definitions of Personal Learning Environment (PLE). *Presentation for PLE Conference in Barcelona*, July 8-9 2010. http://www.slideshare.net/ibuchem/definitions-of-personal-learning-environment-ple-4029277?from=ss_embed.

Cross, S., Conole, G. January 2009. *Learn About Learning Design*. Institute of Educational Technology. The Open University (UK). http://ouldi.open.ac.uk/Learn%20about%20learning%20design.pdf.

Downes, S. 2010. *Pedagogical Foundations For Personal Learning.* http://www.slideshare.net/Downes/pedagogical-foundations-for-personal-learning.

Elch. O. 2010. *Twiter as a PLN.* http://whatsnewintheworld.net/2010/01/Twitter-as-a-pln/.

Engeström, J. 2005. *Microblogging: Tiny social objects. On the future of participatory media.* http://www.slideshare.net/rashmi/jyri-engestrom-social-objects.

Grosseck, G., Holotescu, C. 2010. Microblogging multimedia-based teaching methods best practices with Cirip.eu. Procedia - Social and Behavioral Sciences, Volume 2, Issue 2 2010, 2151-2155. *WCES 2010 Conference: Innovation and Creativity in Education.* Istanbul, 4-8 February 2010.

Grosseck, G. 2009. This is not letter C. http://www.slideshare.net/ggrosseck/this-is-not-letter-c.

Hart, J. 2009. *C4LPT Guide to Social Learning*. http://janeknight.typepad.com/pick/2009/11/c4lpt-guide-to-social-learning.html.

Hart, J. 2009. *Top 100 Tools for Learning 2009.* http://www.c4lpt.co.uk/recommended/index.html.

Holotescu, C., Grosseck, G. 2010. Learning to microblog and microblogging to learn. A case study on learning scenarios in a microblogging context. *The 6th International Scientific Conference eLearning and Software for Education Bucharest*, April 15-16. 2010.

Ioan, P. 1995. Educaţie şi creaţie. În perspectiva unei logici "situaţionale". Editura Didactică şi Pedagogică. Bucureşti.

Ivanova, M. (a) 2009. Use Of Start Pages For Building A Mashup Personal Learning Environment To Support Self-Organized Learners. *Serdica Journal of Computing* 3, 227–238.

Ivanova, M. (b) 2009. From personal learning environment building to professional learning network forming. *The 5th International Scientific Conference eLearning and Software for Education Bucharest*, April 9-10.

Ivanova, M. 8-9 April 2010. Design and Development of a 3 Dimensional Personal Learning Space, *5th Plymouth e-Learning Conference: Learning without Limits: Facing the Challenges.*

Jarche, H., Learning and microblogging. blog post: 24 June 2009. http://www.jarche.com/2009/06/learning-and-micro-blogging/

JISC. *The Personal Learning Environments Reference Model Project*, http://wiki.cetis.ac.uk/Ple.

Johnson, M., Liber, O. 2008. The Personal Learning Environment and the human condition: from theory to teaching practice. Interactive Learning Environments. 16 (1). 3-15.

McNeill, T. 8-9 April 2010. Twitter is dead: Reflections on student resistance to microblogging. *5th Plymouth e-Learning Conference: Learning without Limits: Facing the Challenges.*

McElvaney, J., Berge, Z. 2009. Weaving a Personal Web: Using online technologies to create customized, connected, and dynamic learning environments. *Canadian Journal of Learning and Technology* / La revue canadienne de l'apprentissage et de la technologie. V35(2) Spring / printemps.

Skill, A., Carhart, J., Houton, D. Wheeler, S. 8-9 April 2010. Integrating Personal Learning Environments into the Primary classroom. *5th Plymouth e-Learning Conference: Learning without Limits: Facing the Challenges.*

Stutzman, F. 2009. Information Seeking During a Life Transition. *AOIR 2009 Doctoral Colloquium.* Milwaukee. http://fredstutzman.com/papers/AOIRDC2009_Stutzman.pdf.

Taraghi, B., Ebner, M., Schaffert, S. 2009. Personal Learning Environments for Higher Education: A Mashup Based Widget Concept, *Publication at Proceedings of the Second International Workshop on Mashup Personal Learning Environments (MUPPLE09).* http://ceur-ws.org/Vol-506/.

Taraghi, B., Ebner, M., Till, G., Mühlburger, H. 2009. Personal Learning Environment – A Conceptual Study, *International Conference on Interactive Computer Aided Learning* (ICL 2009), Villach, AT.

Van Harmelen, M., Metcalfe, M., Randall, D. 2009. The Manchaster PLE Project. *JISC Emerge Benefits Realisation*. http://reports.jiscemerge.org.uk/Benefits-Realisation/View-category.html, web-pages accessed on 10 June 2010.

Waters, S. 2008-2010. PLN yourself. http://suewaters.wikispaces.com/Twitter.

Wilson, S. 2005, Jan 25. Future VLE – The Visual Version, blog: http://zope.cetis.ac.uk/members/scott/entries/20050125170206;

Wheeler, S. 2010. PLE vs VLE. 23 March 2010. http://steve-wheeler.blogspot.com/2010/03/ple-vs-vle.html.

A brief history of PLE can be found on Wikipedia, http://en.wikipedia.org/wiki/Personal_Learning_Environment.