Future Teachers Looking for their PLEs: the Personalized Learning Process Behind it all

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Abstract. This paper reports the results of a naturalistic study obtained from a teaching experience in higher education with first year students of the Primary School Teacher degree. In this study we want to analyse how they are organizing their activity for learning (reading, reflecting and sharing knowledge) and how those learning processes are integrated on their PLE.
In order to achieve that, they have been reflecting about the learning basic "components" of their course activity: reading (in a multimedia way, or not only by text), doing (reflecting and creating cognitive artifacts), and sharing (discussing, showing, and providing and receiving feedback from and to a community of reference), they have made relationships between those components and technological tools, if there is any, and using those they have created mind maps for representing their PLEs. The idea is try to understand how are PLE organized and perceived by learners but not starting from the technological point of view but from the learning processes perspective.

Keywords: PLE, thinking process, formal learning, integration, learning processes, learning components, metacognition.

1 PLEs and the Thinking Processes Behind, the Next Step

In the last years, the majority of the approaches to PLEs analysis have been centered on the analysis of diagrams of PLEs (Leslie, 2008a & 2008b; Scott, 2008; Castañeda & Soto, 2010). Nevertheless, even when the approaches to the PLEs as a technological structure have provided us with very interesting perspectives around PLE building, and around beliefs and worries behind PLE concept from our point of view this specific approach is already over and –despite the use of this method for analysing some specific cases- we have to move forward, in order to test new approaches and methodologies that could show us more angles of our object of study.

This paper reports the results of a naturalistic study obtained from a teaching experience in higher education with first year students of Primary School Teacher degree. In this study we want to analyse how they are organizing their activity for learning (reading, reflecting and sharing knowledge) and how those learning processes are integrated on their PLE.

It is almost a common place, the idea that the current technological environment (Web 2.0 , mobile technologies, and so on) provides learners with the opportunity of building a technology enhanced environment, networked and enriched by with the interaction of other people and basically controlled by themselves (Attwell, 2007; Buchem, Attwell &Torres Kompen, 2011). In this environment the person could include, organize and manage their informal, formal and non formal learning resources, tools and experiences (Adell & Castañeda, 2010). This is, surely, the main idea that has supported underlies our interest in the study of Personal Learning Environments during the past decade.

Nevetheless, from the practical point of view, even when we have already analysed how learners integrate technologies on their PLE and how they use those technologies (Salinas et al, 2011; Casquero et al., 2011, Castañeda & Soto, 2010; Castañeda, Costa & Torres Kompen, 2011; among others) in order to try to better understand the processes behind PLE structures, actually those studies only give us technological perspective of our object of study. Nevertheless, if we understand PLEs as a pedagogical approach with a strong technological base, this technological perspective of analysis that we have used is far from being enough in order to study it.

With this perspective, in 2010, Drexler (2010a & 2010b) proposed the idea of analyzing the networked students learning environment. On her proposals, the author remarks the importance of understanding the processes of learning that are behind the educational process, because those processes are the fundamental structure of the learning.

Then, taking advantage that we are working with a small group of students (the normal ratio of students in this university are 100 by group), and continuing with the strategy of introducing them to the "Web 2.0 world", we tried to explore how they have integrated their processes for learning into their PLEs and built their PLEs taking into account the tools they use but specially using, as a base of building, the learning processes carried out on each activity and during the whole course.

Consequently, following the Drexler, and taking advantage of the extraordinary teaching conditions we have on this period, we decided to explore a different way of PLE analysis. The idea is try to understand how are PLE organized and perceived by learners but not starting from the technological point of view but from the learning processes perspective.

2 The Study

2.1 The Sample

For this experience we have tried to analyse the learning processes behind the course activity of students in the first year of Primary School Teacher degree at the University of Murcia (Spain) in the second part of the period 2011-2012. We are going to analyse the learning activities that configure the complete course "School Organization and Educational Resources" that is carried out completely face to face.

In total we are working with 30 students from 18 to 43 years old, with only 6 men in the lass (20,68 %), and they all are working only with one teacher (one of the paper authors) on this course.

Although the students do not have any technological training before –apart from some course in the high school and secondary education, and this course is not directly related to ICT- they have been already introduced to the PLE concept and Web 2.0 impact on education in other course that is organized by the same teacher and in which all of them are involved.

Students are divided into 6 different groups formed in a complete naturalistic way (voluntary), and some of the have worked together in other courses, during the first semester of this year.

2.2 The Course Structure

The course has been structured on 6 activities that have configured the dynamic inside and outside the classroom, the organization of the lectures, the resources as well as –of course-, the assessment processes. All those activities have been organized by groups and documented by students using a Course Diary done through a group blog.

Some of the activities are completely developed in the classroom, and the others must be completed by students between sessions; all of them have a final task or product that could be analogical or digital; additionally all the activities start with an introducing lecture provided by the teacher and only one of them was introduced by a guest teacher. The LMS used in the University of Murcia is SAKAI so the resources and material provided by the teacher are included in a course on this LMS.

All the activities, but one, are 2 weeks long and weekly participants have 2 face to face sessions, one of 2 hours and the other with 1. In total, 3 hours.

2.3 A simple method of data collecting

As we mentioned, students have been working on 6 learning activities that structured their learning process.

In the final part of the course, each group had the task of creating its assessment ePortfolio, and had to include on it mind maps for representing the learning process followed on each activity. Additionally, groups had to include a mind map that summarizes the general learning process of the course. The idea –explained by the teacher- was that they include on the mind map the thinking processes behind each learning activity and the tools (technological or not) related to this process.

This extra activity is included as a part of the metacognitive strategy of the ePortfolio (Kitchenham, 2008), understanding that this reflection could help students to understand better their learning processes and maybe, help them to be aware about ways for improving this.

According to the PLE literature, and trying to help them to start their reflection, we have provided students the definition of PLE (Adell & Castañeda, 2010), and we have remarked that any learning process could be configured basically by three basic "components" (Attwell, 2008; Adell & Castañeda, 2010): reading (not only text but multimedia), doing (reflecting and creating cognitive artifacts), and sharing (discussing, showing and providing and receiving feedback from a community of reference). We hope those “parts” could help students to start thinking on and structuring their maps.

In order to improve the understanding of the representation we have asked for, students made a first attempt in the classroom (in other course conducted by the same teacher), and on it they could ask for the teacher about the details to be included on

their maps. We strongly encouraged them to include on those maps formal, non-formal and informal processes that they considered as a part of their learning process.

Once we have collected the maps, we have made a formal general analysis of them, and further, a content analysis of each of them. Additionally we have analysed the learning activity mind maps by groups, by activity, and in a general vision.

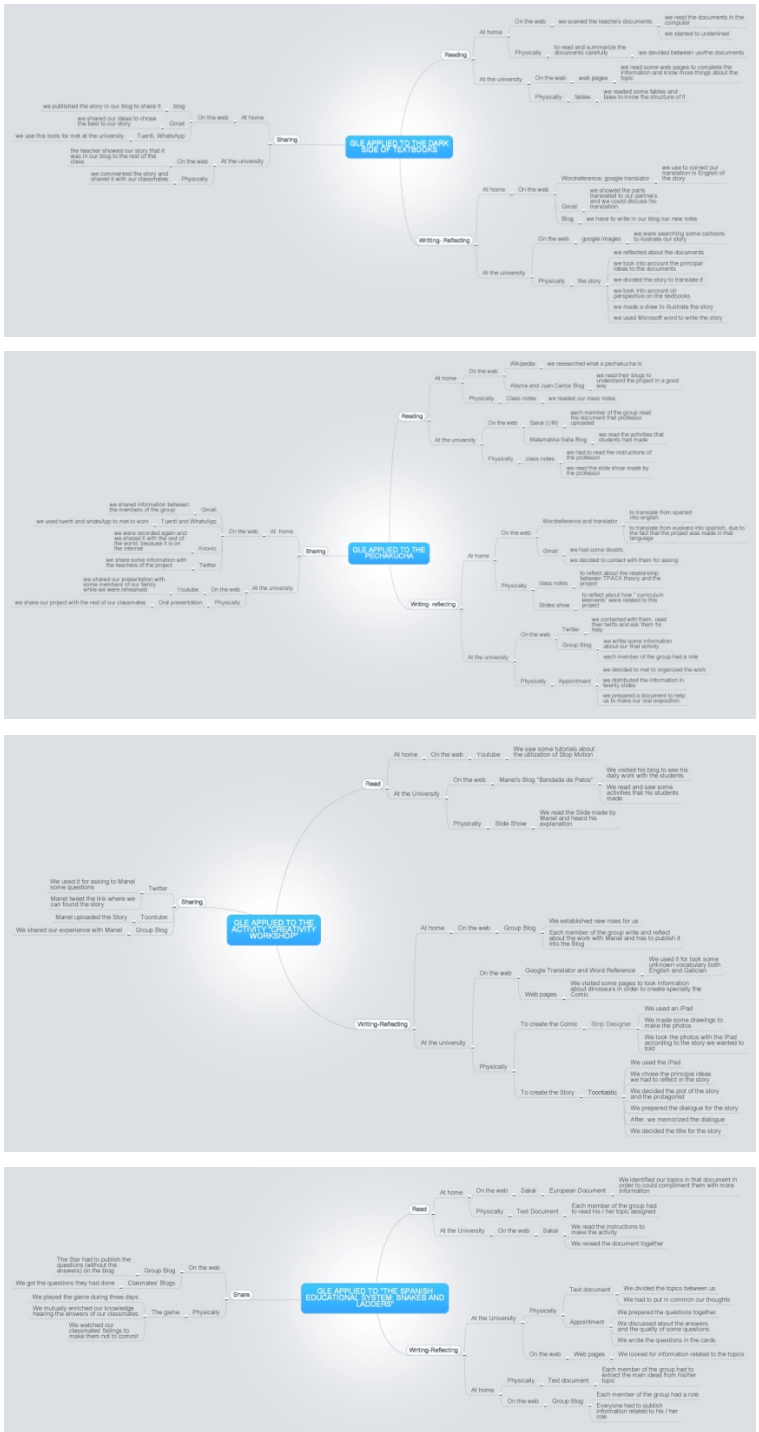
We are aware that this is not a strictly Personal Learning Environment study, firstly because they are working in groups. Nonetheless, we think the group work could help students to reflect about their learning process. At the same time, the inclusion of a complete course in the analysis could give a more global perspective of a learning process, as well as this group exploring would be easily extrapolated or projected to an individual level.

3 Data Analysis

We have finally collected a total of 36 mind maps (1 by each activity and group, 6 activities, 6 groups) related to the learning process behind each activity. Therefore, there is a collection like the following for each group:

Illustrating Words

TPCK



The Dark side of Textbooks

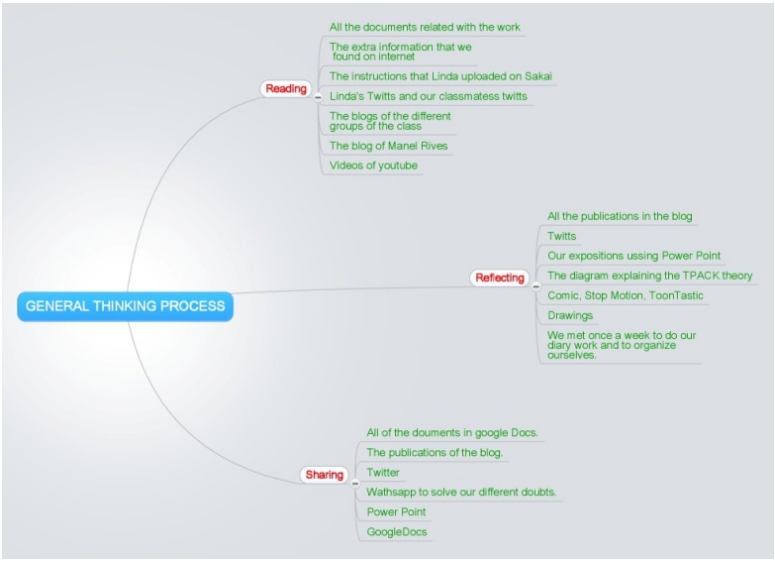
PK Educational Projects

Creativity in Classrooms

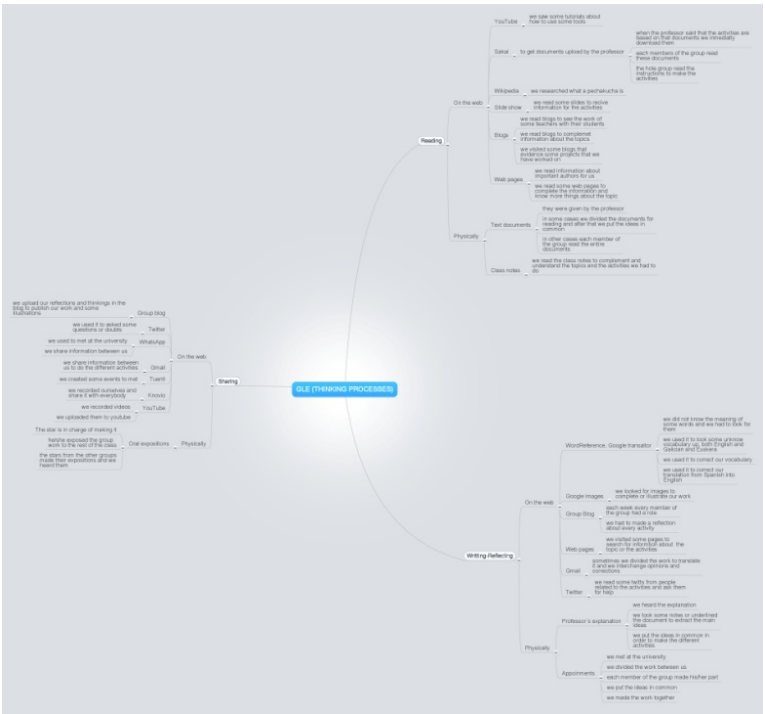
Spanish Educational System

Fig. 1. *Group CHD*. Learning processes mind maps by activity.

In addition we have collected 6 general learning processes maps, one from each group, as follows:



TBB Group



CHD Group

Fig. 2. General Learning processes. *Group TBB and CHD*

Taking into account this amount of data, we think that showing here the analysis of the 36 diagrams does not give us much information. Therefore, doing a content analysis of those diagrams but in categories, as so as we can show in the following sections some of the data they show us basically at two levels:

- By groups: In two ways, the first where we have analysed the diagrams one by one and also we have analysed the tendencies observed in all of the diagrams of the same group, and the second, where we see if there is any difference trend shown by the general learning processes diagram of each group.
- The general level: where we have used two ways for analysing. Firstly, the vision provided by the union of every activity mind map in a general one. And secondly, the general perspective studied from the union of the general learning processes mind maps of each group in one more general.

On each level the basic focusses of analysis will be, basically, two:

- The learning basic "components" shown on the mind map: reading (in multimedia way), doing (reflecting and creating cognitive artifacts), and sharing (discussing, showing and providing and receiving feedback from a community of reference).
- The supporting of technological tools shown for each learning process, so we have analysed each component on its version technologically supported and only physically supported.

3.1 Analysis by Groups

TBB Group. Firstly we have to say that this group perceive the importance of the technological support of learning processes in a different way depending on the learning component that we analyse; this importance is also different if we see all the mind maps from the different activities, or if we see the general learning process mind map.

We start this part analysing the mind maps with the learning processes and tools for each activity.

From the *reading* point of view, the main source showed in diagrams is the teacher and the resources provided by her via SAKAI and on her lectures. It is interesting to remark that the majority of the access to information is done with technological support where the group focus, apart from reading the documents provided by the teacher, on the process of "looking for information about the topic" in "Websites ", the "internet".

Fig. 3. Word cloud of the *reading* technologically supported processes[1]. Group TBB

[1] Linda is the name of the responsible teacher of the course

It is interesting to remark that in the learning processes associated to recover information (reading) without technological support, students only includes the lectures (done by the teacher or by one guest teacher) as part of their learning environment, do not include any complementary resource.

In contrast, once we analysed information about *Doing* for learning on their maps, the majority of processes are related to the group activity and they remark their activity around "creation" "writing" and "drawing" using principally pencils and paper. Even when there is some activity supported by technologies in this component (specially the production of some specific artifacts slideshows in Power Point or Slide share) this activity is much less than the physically supported.

In the case of processes related to *sharing*, in the mind maps this component is more associated to technological tools and, in the majority of the cases is not associated to verbs of action, only directly to the tools, and definitively the most used tool used for sharing is the group blog developed in Blogger. Additionally it is remarkable the use of multimedia tools, social networking sites (from here on SNS) and the use of instant messages tools as Whatsapp for sharing.

Fig. 4. Word cloud of the *sharing* technologically supported processes. Group TBB

Sharing without technological supported is limited to the activities of exposition and presentation in the classroom.

We have to remark that in the case of this group, the results showed by the analysis of the activities mind maps give us a different perspective of the technological support of each component. As we have mentioned, in the processes exposed in the activity mind maps, the *Doing* component is basically supported in a non-technological way, nevertheless, if you see the general learning processes mind map, it showed almost the same amount of processes technologically supported and non technologically supported.

BD Group. In the case of this group it is interesting that they include on their diagrams not only processes and associated tools, but reflections about those processes. It help us to understand, for example, that in the normal activities the learning process start with the lecture provided by the teacher, but in the case of activities that start with the lecture from an invited lecturer, students decided to start reading some materials from the Internet in order to prepare the activity. In addition it is quite interesting the importance that they give to the non technological process of thinking before starting using tools, expressed as:

"people used pencil and paper to write first reflects about the activity and to start thinking about the questions" BD Group

In the three components of learning (reading, doing and sharing) that this group includes on its maps (activity learning processes maps and general learning process map), the technologically supported processes are the most important.

About *reading*, as in the case of the previous group, students remark the importance of getting from the Internet information complementary to the information provided by the teacher, and they use generalistic tools for searching it: Google, Blogs, Websites, Youtube and Twitter. In the case of non technologically supported learning processes, they only *read* documents and information directly provided by the teacher.

In relation to *doing*, they usually include on this component processes related to the process for completing the tasks: reflecting, describing, developing, correcting and deciding. Nonetheless, the processes are expressed individually and not in terms of working together. It is interesting to note that is on this group where we see included on its process the verb "thinking" related to the *doing* component but without a technological tool related.

Fig. 5. Word cloud of the *doing* technologically supported processes. Group BD

Finally, there is worthy of note, that this group includes SNS as technological tools that support the reading, doing and sharing components of learning, and understand the Blog as the greatest tool of sharing not only with classmates but friends and colleagues.

CL Group. Related to the importance of the technological support of learning processes and in the different components, in this case -as in the TBB Group one- there are differences between the information they give us in the activity mind mpas than in the general learning process diagram that we can resumen on the following table:

Table 1. Technological Support Vs. Non Technological Support in the Three Components of Learning, differentiated by data source. *CL Group*

	Learning Process by Activity			General Learing Process		
Reading	Tech Support	>	No Tech S.	Tech Support	>	No Tech S.
Doing	Tech Support	=	No Tech S.	Tech Support	=	No Tech S.

Sharing	Tech Support	=	No Tech S.	Tech Support	>	No Tech S.

They specially read using technology and it is remarkable that, apart from the sources provided by the teacher (that continue being crucial and, even more, exclusive in the non technological supported modality) and other complements looked on the Internet, this group read habittually blogs from their coursemates.

In the processes related with the *doing* component, as in the previous groups we have analysed, they concentrate their processes on the creation of artifacts. Moreover, it is very interesting to see that in this case they not only include individual processes of creation but they also include the process of "listening to classmates about the topic" (without technological support), so they really include process related to collaboration in the dinamic of each activity.

Fig. 6. Word cloud of the *sharing* no technologically supported processes. Group CL

In the case of this group they concentrate all their work related to sharing -almost exclusively- in the Blog and in the compulsory classroom dinamics for putting in common the activities (expositions and presentations).

CHD Group. In their representations of their learning environment and processes this group not only differentiate between technologically supported or not, BUT between inside and outside the classroom.

The data provided in the two ways (by activities maps and the general learning process diagram) expressed that they develop the majority of their process of learning (in the three component: reading, doing and sharing) supported by technologies.

In relation to processes of *reading* (completing, reading, looking for, and so on) they prefer to use the sources included in the institutional LMS -SAKAI-, and general Webpages, as well as Wikipedia and some specific Blogs from experts. Nonetheless, when we see the not supported by technology processes, the importance -where not the exclusive use- of the teacher provided resources (lectures, classnotes) is more evident that at any group.

Fig. 7. Word cloud of the *reading* no technologically supported processes. CHD Group.

When we analyse the processes related with *doing*, it is interesting to see how the majority of the technologically supported processes are related to the correcting of the work done without any technological support, specially with translation (usign Google translator, Wordreference, and so on). In addition, in the non technologically supported processes they reveal that they need to be together (f2f) in order to develop those processes (drawing, dividing, preparing, etc.).

In the case of the *sharing* component related processes, apart from almost the same situation as the rest of the groups, it is remarkable that this component shows the widest diversity of technological tools to be developed and. in the case of this group specifically, they also think on the possibility of sharing with their families.

IKWYD Group. This group presents differences between the information they give us in the activity mind maps than in the general learning process diagram, related to the importance of the technological support of learning processes and in the different components. We can resume on the following table:

Table 2. Technological Support Vs. Non Technological Support in the Three Components of Learning, differentiated by data source. *IKWYD Group3*

	Learning Process by Activity			General Learing Process		
Reading	Tech Support	<	No Tech S.	Tech Support	=	No Tech S.
Doing	Tech Support	<	No Tech S.	Tech Support	<	No Tech S.
Sharing	Tech Support	>	No Tech S.	Tech Support	>	No Tech S.

It is very evident, on every mind map developed by this group, that verbs related to mental processes (thinking e.g.) are habitually non related to any technology, in contrast more "manual" verbs and processes are related directly to technologies.

As we have already seen in previous cases, the teacher is the principal source of information and materials for *reading* (reading, listening, extracting), and it is interesting to see –as in the other groups- how in the technological supported processes related to reading there are some multimedia sources, normally video tutorials.

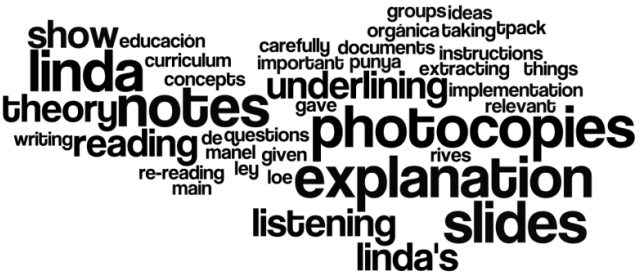


Fig. 8. Word cloud of the *reading* technologically supported processes. *IKWYD Group*

In relation to the component of *writing* there is not much to say, apart than the most common verbs related to technological supported processes are Recording, editing digitalizing and contacting; but the verbs that are not related to technology are choosing thinking and organizing.

In the case of the processes related to the *sharing* component of learning, the data on this group remark the same as in the other groups, as so as the Blog is the principal tool for sharing and the only processes related to sharing without technologies are related to the classroom compulsory dynamics of presentation.

NTL Group. Finally, in the case of this group the majority of trends observed in the rest of the groups are also present.

We only see that, even when the other groups see the *sharing* component as the final part of activity and not much related to learning, in the case of this group they include in the *sharing* component some actions to be done during the process itself. Additionally the not only share things about the task included on each activity, they also see as learning processes, sharing about their feelings, behavior, and so on.

For this group, the learning processes related to the *reading* component are technologically supported as well as non technological at all. But, again, the only source of information not necessarily supported by technology is the teacher.

In the learning processes related to *doing*, the majority of the activity is concentrated in the non technological supported activities, but, in the processes related to *sharing*, the majority of the activity is hardly technologically supported.

3.2 General Analysis

Based on the Union of Activity Learning Processes Mind Maps. As we have said previously, we have also made the union of every part related to any learning component, in order to see the general trends that these diagrams could show us. Some of this data follows.

About processes related to the reading component of learning. Firstly, we have to say that, in the joint view of activity diagrams, the huge majority of learning processes related to this component are technologically supported.

Students read the information that teacher includes on the course LMS and look for some complementary information in the generalistic Internet tools (Google, Websites,

Blogs from other people). Moreover, this searches are multimedia and lot of them look for videos in order to understand better concepts and visions.

Fig. 9. Word cloud of the *reading* technologically supported processes. *All the activity mind maps together*

However, in the *reading* related processes the source is almost exclusive and "looking for" outside the technology could be considered marginal in our students. Students do not look for almost anything no technologically supported as complement to the information provided by the teacher.

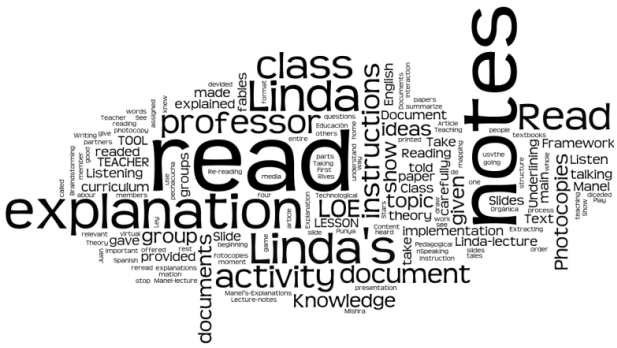


Fig. 10. Word cloud of the *reading* NO technologically supported processes. *All the activity mind maps together*

About processes related to the Doing component of learning. In the cases of the learning processes related to the *doing* component, the distribution between non technologically supported and technologically supported is very similar.

We can see processes related to designing, developing, writing, reflecting, among others on this part, and in relation to the widest diversity of Web 2.0 tools in almost any format and using very different codes (always dependent of the task asked in the activity).

Fig. 11. Word cloud of the *doing* technologically supported processes. *All the activity mind maps together*

Learning processes related to the *doing* component but not directly related to any technology are more around taking decision processes, putting in common, thinking, making drafts and writing in the F2F context.

About processes related to the Sharing component of learning. The vast majority of learning processes related to this component shown into the group activity diagrams are related also with a technology. Nonetheless, the sharing tool by definition is the group Blog.

On it, and complementary to other Web 2.0 tools, students publishing, presenting and uploading their artifacts and show them in the final version (they remark a lot the final character of their productions for sharing, they do not share anything in process) to their colleagues, friends and the world.

Therefore, SNS also acquire a crucial role supporting these processes.

Fig. 12. Word cloud of the *sharing* technologically supported processes. *All the activity mind maps together*

Based on the Union of the Group General Learning Processes Diagrams. Additionally to the previous analysis, we have made a join vision of the general learning processes mind maps (see fig. 2) in order to have a complementary perception about the learning processes.

Nevertheless, once we have finished the analysis, the results we have obtained are exactly the same we have already shown on the immediate previous section. So we understand that there is not necessary –even desirable- repeat them.

4 Some Conclusions and Questions

Even when we are aware about the limits of this study related to sample size, the fact of our students are in a very formal learning environment, they are speaking not about Personal Learning Environments (PLEs) properly but about Group Learning Environments, and some others, we appreciated some interesting conclusions that could give us some interesting ideas in order to think about the PLEs nature, the implications of PLEs in formal learning processes, as well as the mutual relationship between formal and informal learning and how it could be seen in PLEs structures and representations.

Therefore, according to the data we have exposed in the previous sections of this paper we can conclude, firstly, that PLE includes, at the same time, technologically supported processes and a non technologically supported processes, and in the majority of cases they have being revealed as mutually complementary. This fact actually remarks the nature of PLE not as a technological tool but as a pedagogical approach with a hard technological base.

Additionally, learning processes more related to thinking and reflecting personally are habitually not related to any technological tool, but learning processes based in actions or active roles of the learner are strongly related to technology. This relation could support very much the trend of including active learning methods as a crucial part of the emergent (in terms of Veletsianos, 2010) pedagogies in the current technological era.

The data we have shown support the idea of a very "uncritical" student. In the process of getting information, students base their activity on the information provided by teachers and, surprisingly, the only complement this information using technological resources. It implies do not search for books, or papers, and off course do not go to the library in order to complement or contrast the information. In consequence, the teacher role as expert exceeds this characteristic and become almost infallible, with all the bad implications of this fact in terms of become critic citizens and so on.

Apart from that, if the teacher IS considered as the ONLY source, also students don't see their peers as sources for recovering information or as complements to the lecturer sources in order to understand better anything. This could be a problem in the long term; not in vain, peers (colleagues, friends, and so on) are one of the most important learning resources of any person on its lifelong learning process and start to appreciate them would be a crucial part of their education.

In the case of processes related to *sharing*, we are worried about the lack of importance students give to this component of learning. In the diagrams, *sharing* is always the final part of the process, and is almost only related to the artifacts that are part of the course assessment, so probably they will stop sharing their works once the assessment of any course will be finished. As a result, we consider that it will be very difficult that students include on their PLEs peers and networks (PLN) for sharing their work in order to get valuable feedback and discussion to learn more.

Also following with the data, "components" of learning we have used as organizers of the learning processes included n the diagrams -*reading, doing* and *sharing*- are easily appreciated by students as crucial parts of their processes, so they could be very helpful in order to structure these kind of explorations. Nonetheless, the kind of verbs related to each one of them, the unidirectional character of all of them, as well as the

publishing character of processes related to *sharing*, have suggested to us that they are not seen by students only as components that could be take part in any moment of the learning process, they seen those as a sequence, something like "*for learning you first recover info –from an expert-, then you have to do something and finally –remarked- you show it to others"*.

This perspective reveals a specific way to understand the learning process that is also the result of the kind of activities we have developed with our students in education in the past years. And those activities have been supported by our educational, epistemological and cultural beliefs around learning and education (Petko, 2012; Prestidge, 2012). Therefore, in order to implement any new perspective of learning it is crucial to make a deep change in the nature and development of learning activities that understand learning as a cycle of processes, more than a unidirectional sequence.

Once finished the analysis, it has been surprising for us to see that there is not any group that includes on their learning processes –even the general one- the processes related to the elaboration of the mind maps, even when the teacher have explained the "metacognitive" intention of the activity.

5 More Questions and Possibly Future Steps

We are pretty aware about the limits of this study. Nevertheless we consider than its weaknesses would give us some ideas in order to go in-depth of the PLEs research and it is also a good point to take into account.

Definitively, once we have explored this method, we need a more qualitative collection of data –probably interviews with individuals in order to complete a more individual and complete analysis.

In addition we think that there is also a very promising way of study, the analysis of the didactic activities used in the course with students, their nature, features, pedagogical beliefs behind in relation to the approach of students to the process for developing the task; as off course, their relation to different perspectives of PLEs.

Even so, we hope this study could help us effectively to open other ways–more based on pedagogy than technology- to understand the study or Personal Learning Environments and could contribute at least only in a small way, to enrich the debate that we have to continue in order to improve the transversal application of this approach to every educational context.

Acknowledges. To the students of the course School Organization and Educational Resources, from the degree on Primary School at the University of Murcia (Spain), in the term 2011-2012, who have made possible all the activities named on this work, have take part in any experience we have proposed them, and given us permission to explore their personal learning processes. As always, this work –lecturing and researching- has any importance because of them. Thank you.

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