Cops' creation and evolution sustained by ICT tools and services

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Abstract

This paper reports the representations and practices evolution of two CoPs' members of the domain of education who used ICT tools and services supporting collaborative edition and documents production. These artefacts related to multimedia authoring, knowledge management and mediation are based on the respect of standards allowing data accessibility, reusability and interoperability. They have been developed within the framework of the European project PALETTE through a participatory design process in which these CoPs were involved.

The evolution of the CoPs' members' representations and practices was observed through answers to a questionnaire (before and after the activities), the individual logbooks weekly handled by the participants, interviews and their productions.

First, we observed that the use of several tools or services allows the members to become more competent in the domain of the ICT in terms of practices and technological literacy. They discover more transverse functions through the tools and feel more comfortable when using new interfaces. This also decreases fears of certain members who had negative representations regarding ICT.

Then, the scenarios concretely offered to the CoPs' members to live collaborative activities supported by ICT artefacts. They could exchange ideas, resources and knowledge. These experiments enabled them to refine their representations about collaborative learning and to get reference tools to support their future activities. They declared the use of these artefacts allowed the emergence of a CoP but also the development of the feeling of belonging to a CoP. The tasks realization during the trials created some common interests between the members. For many of them it was their first experiment in collaborative edition. They learned favourable modes and codes to produce and exchange when carrying on this kind of task. They also perceived the importance of the role of a CoP animator.

As for the production of documents, the discovery of several new tools allowed the CoPs' members to compare them with different editors and examine their advantages and disadvantages. Even if the tools were not still or sufficiently accepted and adopted by the members, this comparison allowed a certain awareness of the importance of standards, exchangeable documents and durability of data.

Keywords

Community of practice, CoP, elearning, learning, ICT, education, participatory design, knowledge management, instrumentation, scenario, collaboration, semantic Web

Introduction

The activities reported hereafter took place in the context of a European project named PALETTE (Pedagogically sustained Adaptive LEarning Through the exploitation of Tacit and Explicit knowledge). Its goal was to sustain the activities of Communities of Practice (CoPs) through the design and the use of Information and Communication Technologies (ICT) tools and services related to multimedia authoring, knowledge management and mediation. These ones are based on the respect of standards allowing data accessibility, reusability and interoperability (Vandeput et al, 2007). A participatory design process (Charlier et al, 2007) involving technical partners, educational technologists and CoPs' members was engaged to develop and enhance these artefacts and their uses.

ISBN 978-1-86220-225-2

We particularly consider the work done with members of two learners' groups being trained in the field of educational uses of technologies. We focus on the representations of the CoPs' members about the use of ICTs and the development of new practices related to collaborative edition and the production of documents when and after they used various PALETTE artefacts. We also observe how the feeling of belonging to a CoP started and evolved among these groups. After a short description of the target public and their context, we present some activities undertaken during the trials of these artefacts. The procedures and kinds of collected data are described and some results synthesized. To conclude, a transfer to other CoP situations and contexts is proposed.

Context

The TIC-EF and TIC-FA CoPs respectively concern members of the communities of learners involved in the courses of « Technologies de l'Information et de la Communication pour l'Éducation et pour la Formation » (TICEF) and « Technologies de l'Information et de la Communication pour la Formation d'Adultes » (TICFA). They are students of 1st master in Educational Sciences at the Faculty of Psychology and Sciences of Education of the University of Liège (Belgium). TIC-EF ones are going to be specialised in "Teaching and research" and TIC-FA ones in "Adults training". These students are coming from different fields: rare are those who are bachelors from the university and enter directly in the two years program of the master in Educational Sciences. Most of them are primary education schoolmaster/teacher, professor of secondary education,… so they had to follow a complementary year to prepare themselves to the master. Moreover they are not identically familiarized with the ICT. Thus, they constitute a heterogeneous public in terms of competences and attitudes towards ICT. At the end of their two years of master, the learners have to capitalize 120 credits. TIC-EF and TIC-FA courses have a weight of 6 credits (estimated to a workload of 144 hours). There are face-to-face activities (+-30 hours) and distance or homework that are evaluated in a formative and certificated ways.

A teacher and her assistant train and supervise these activities. They are also considered as the CoPs' animators. The two courses deal with a global common topic: the use and the integration of ICTs in training and learning contexts. So it is a good opportunity to experiment the PALETTE tools and services, the hypothesis being that those ones can support learning, interactions, capitalization of knowledge… among CoPs members or even among a community of learners.

Artefacts supporting the trials

Five PALETTE tools or services were trialled through different scenarios dealing with production of documents, collaborative edition and identity building and debate:

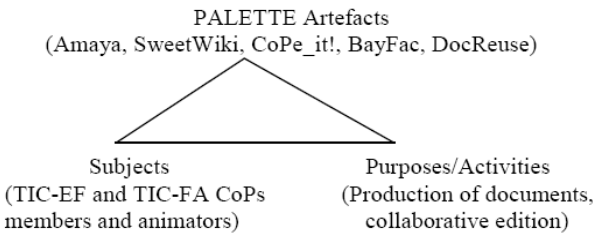

Figure 1 : PALETTE artefacts used by theTIC-FA and TIC-EF CoPs

- Amaya is a Web editor. Browsing features are integrated with the editing and remote access features in a uniform environment. It also allows the design of templates that should favour the reusability of data.
- SweetWiki (Semantic WEb Enabled Technology Wiki) is a wiki engine that has been developed around the semantic web technologies. It allows edition of Web pages and tagging.
- BayFac is a service aiming at providing a mean to semi-automatically index (with the help of bayesian engine) and retrieve textual documents on the basis of facets regarding concepts relevant to a CoP.
- CoPe-it! is a Web-based system attempting to assist and augment collaboration being held among members of CoPs by facilitating the creation, leveraging and utilization of the relevant knowledge. The system follows an argumentative reasoning approach, which complies with collaborative principles and practices."
- DocReuse (Document Reuse) is a service enabling the semi-automatic reuse of structured documents.

ISBN 978-1-86220-225-2

For a detailed description of these artefacts and of how they can support CoPs, see the Service Gallery space of the PALETTE project website (http://palette.ercim.org/component/option,com_servicegallery/Itemid,120/).

A familiarization process with the use of the artefacts was undertaken each time a new one was introduced. It was based on different training strategies (Denis & Leclercq, 1995) depending on the proposed scenario.

Scenarios of artefacts uses

These scenarios propose nine activities, including each one trials of at least one PALETTE artefacts. Activities refer to documents production and others to collaborative edition. They concern reification of knowledge, collaboration with debate and decision making and the CoP's animation process seen under the angle of identity building.

Analysis and comparison of educational environments through two models

The CoPs members have to analyse and compare four training environments through two theoretical models. A scenario combining the use of four services was created and tested. It aims at developing

- the animation and identity building of the CoPs: SweetWiki was used to register to the service, create a WikiName and some workpages, explore the created workpages proper to the CoP, create a homepage (personal profile), tag the pages to create folksonomies according to the domain of the CoPs;
- the reification of knowledge through the production and the reuse of resources. With Amaya, the animators conceived templates recovering the theoretical models. They allocated to different pairs of learners an analysis model and a learning environment to analyse. The CoPs' members analysed these environments starting from a theoretical model and fill the templates, edited the documents on the basis of templates. Then the animators reused those data to display a comparison of the results analysis (DocReuse);
- the CoP's memory building with the help of BayFac to upload and classify resources. Facets and their values to allow the classification of the documents were identified by the animators. Resources produced (notably those with Amaya) were posted to build a common repository and attribute them facets.

Create a pedagogical scenario based on ICT use and live process of collaborative learning

This scenario was prepared for the TIC-EF CoP, but was not fully trialled. It is based on distance collaborative activities where the participants have to negotiate and decide the topic of the collaborative product (educational scenario including the use of technologies) to be achieved (cf. Denis, 2001; Banks et al, 2004). Just a part of the presented scenario was played since some tools (DocReuse and the Amaya templates) were not enough usable to be used independently from the developers.

The following activities were planned regarding CoP management, collaboration and reification of knowledge:

- The identity building and animation of the CoP is sustained by the use ofCoPe_it! to create the TIC-EF community, join the community and create workspaces for the CoP.
- CoPe_it! also support collaboration activities based on exchanges, debates and negotiations into groups and the decision about the choice of the contents linked to the pedagogical scenario to be conceived collectively (e.g. the public concerned, discipline, didactical resources, ICT tools…)
- A part of the production of the own CoP resources (reification of knowledge) is made with SweetWiki and Amaya. It consists in incorporating the essential ideas and decision makings coming from the debate into collective documents, tagging the created pages and producing collaboratively a first draft of the scenario.
- The CoP memory can be built by uploading and classifying the documents with BayFac.

Keep a logbook (portfolio)

Keeping a logbook and a portfolio allows CoPs' members to produce personal data and capitalize their productions. They write down reflections on the training activities, compare them to their expectations. They also consider topics such as their ICT mastery, documents production, collaborative edition, usability and acceptability of the proposed resources and collaborative learning.

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Every week, the members fill their logbook and send them to their teacher. The goal is to help them to keep tracks of their learning process during the activities… and to collect data about the trials. Each version of their logbook is edited with Amaya. Using this tool at least once a week sustains their knowledge reification process.

Edit news about the ICT in Education (ICTE): the "WikiNews"

With the "WikiNews" activity the learners have the possibility to edit particular information on ICTE (last novelties, innovations…). For this purpose, the students have access to the SweetWiki service where a specific page is dedicated to the news concerning the domain of their community. This is a cooperative and recurrent activity where the CoPs' members can create their identity.

Edit collective documents on a particular topic

These CoPs also made some punctual uses of the artefacts to elaborate shared documents on a particular topic.

- They collaboratively created "Netiquettes" with SweetWiki (SW). They conceived charters collecting recommendations about the use of different types of services: Wiki, chat, email and forum. For each CoP, four different pages (one per service) were created.
- TIC-FA members analysed two Learning and Organizational Resource (LOR) produced by PALETTE researchers (Ashwin et al., 2009). The first LOR is an adaptation of "Yellow pages". It deals with the constitution of a repository of contacts by creating personal pages in SW. Each individual provides information on its current work, professional qualifications, main interests… and complete their profile adding a photo and creating a link towards another resource. They also have to tag their pages in order to facilitate the retrieval of colleagues or specific expertise. The second one is named "MapCoP". It consists in building a conceptual chart or a diagram representing the CoP. In group, the learners think over the place and the role of each CoP member, the shared interests, the way of working together, and the future of the CoP. They also can consult resources on what is a CoP (e.g. Wenger, 2006). During this activity, they spontaneously adopted the name of TIC-FA CoP and maintained it until at least the end of the year.
- In each community, the members are confronted to the concept of ICT invariants (Vandeput, 2009). During a course, the learners created themselves personal pages where they gave their definition of invariant and some examples. The animator created a general page within SW with hyperlinks to the CoP member ones. This activity is in line with the knowledge reification and more particularly, production of CoP resources. Its content also deals with ICT literacy.

Tag web pages

Bound to the knowledge reification, the function "Tag" is exploited on several occasions within the CoPs since their members must allot tags to each page created in SweetWiki. They can seek, find their productions and/or reach the others'ones and then have access to a common capital of knowledge located in their wiki pages. These tags will constitute the folksonomy of the two CoPs. Notice that they are also invited to use other services like de.licio.us to tag documents. This folksonomy can be a basis to produce a CoP's ontology.

Search for resources through facets and their values

To contribute to CoPs' reification of knowledge and their identity building, the CoPs animators prepared documents to be classified and defined the CoPs domain "ontology" that permitted to the service developers to create the facets and values to be used into the TICEF & TICFA BayFac space. The CoPs' members used this space to search for resources (define a question, search resources using one or several facets. They write a report on the obtained results, the accuracy of the information, and commented the service usability and acceptability. Later they should provide documents to be uploaded and classified by themselves or by the animators.

Debate on the feeling of belonging to a CoP

As the TIC-FA CoP was an emerging community, a debate between their members took place within the CoPe_it! service in order to exchange on their feeling of belonging to a CoP. Also related to identity building,

ISBN 978-1-86220-225-2

this activity focuses on the debate based on member's representation and input from documents. In addition, information resulting from the debate can be (re)exploited in the logbooks produced using the Amaya tool.

Following these activities, at the end of the year, the TIC-FA learners produced a common resource (mouse pad) illustrating their happiness to be the TIC-FA CoP.

Research plan and data collection

Our hypothesis is that the use of the artefacts modifies the representations related to documents production and collaborative edition as well as the acquisition of new practices (those prescribed by the PALETTE developers).

Research plan

The following schema summarises our research plan.

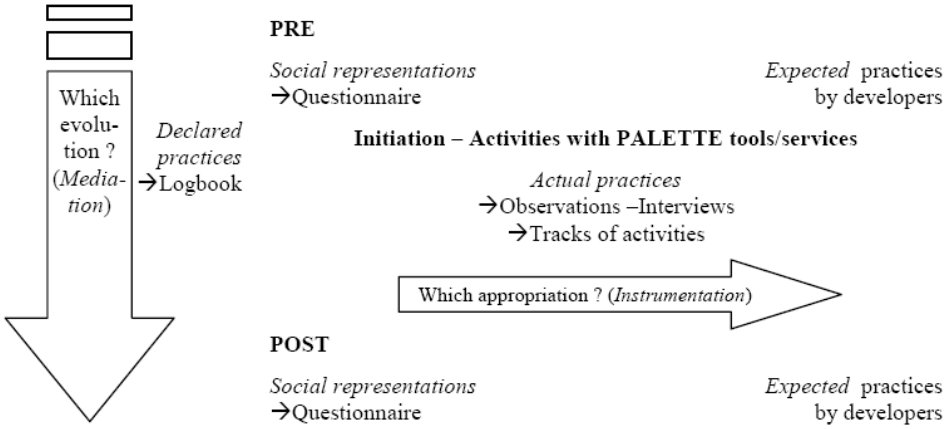

Figure 2: research plan

Data collection

Four procedures are used to collect different kinds of data:

- Student's representations are gathered by means of a questionnaire. Its 55 items are grouped into seven categories dealing with CoPs' members behaviors with regard to ICT uses (degree of familiarity, documents production…) or of collaborative work or learning. The CoPs' members answered twice the questions between September and December 2008: before (PRE test) and after (POST test) the activities. We worked with small number of people (N_{TICEF}= 14 and N_{TICFA}=10), so the data analysis relies on a descriptive approach which leads to qualitative treatments highlighting the changes and describing the way in which the students adopt the PALETTE artefacts. The questionnaire has been preliminary validated to its submission to the CoPs by students that participated to TICEF and TIC-FA courses during the former academic year.
- Declared practices are collected in the students' logbooks in which they comment the activities (CoP members' practices related to collaborative edition and production of documents as well as to the artefacts acceptability and usability). A content analysis was made on 10 series of logbooks of 14 TIC-EF CoP members (149 documents) and of 9 members of TICFA (N= 119 documents).
- The animators carried out direct observations during the realization of the activities to get information on the actual CoPs' members' practices. These observations of students using the PALETTE artefacts are completed by questions asked by the animators (a type of semi-directed interview) in order to go into detail when vague points emerged from the first observations and other data analyses.
- We also kept tracks of the learners' activities within the framework of collaborative edition and documents production. These data represent students' actual practices recovering on the one hand, interactions, negotiations, individual and collective interventions when editing collaboratively and on the other hand, various stages (or various versions of a document) during the documents production process.

Note that ethics and deontology principles have been respected. The goal of the research has been presented to the CoPs members. They know they participate to a research action based on participative design. More, we are also aware that some social desirability phenomena's can appear in this context.

ISBN 978-1-86220-225-2

Results

We briefly report and compare the evolution of the two CoPs' members regarding their representations and declared practices before, during and after the trials. A more detailed analysis of the data, on the one hand PRE and POST questionnaires and, on the other hand reflections on the contribution of each tool or service concerning the considered aspects, is presented in Charlier et al., 2009 (pp. 85-120).

ICT mastery

The logbooks of the first courses expose certain fears and concerns among TIC-EF CoP members. The learners feel to have some (big) lack of knowledge about the computers uses and feel unable to teach them effectively. Even if certain questions remain and certain competences are not mastered yet, the learners progressively declare to be less lost than before when they use new interfaces and to become able to explore different tools in an autonomous way. Two students explicitly attribute this confidence increase to the discovery of various technological tools. So, it seems that the learners feel more competent and confident with ICT than before the activities since they have been confronted with several technological universes, in particular PALETTE tools and services (Amaya, SweetWiki and BayFac). This is detailed in the next sections.

Use of technological tools to produce documents and to edit one in a collaborative way

The artefacts uses enlarged their representations and competencies about documents editing:

- Even if they still often mention tools from Microsoft Office, the CoPs' members generally use more tools than before (mainly Amaya). Amaya is considered as a word processor as well as the MSWord or the OpenOffice Writer. They compare these tools and understand the interest to privilege Amaya for its dimensions "Respect of standards (HTML)" and "Accessibility by others". It enabled them to discover another way to edit documents and by comparing it with others, the CoP members learn invariants present in software dealing with the same kind of task. Nevertheless, they do not adhere yet to this tool. The Amaya acceptability is not yet sufficiently developed so that they use it apart from the courses obligation. But we also note a clear evolution in the Amaya use. The first documents presented no layout, neither the addition of images, nor of tables whereas the last productions have more sophisticated forms. In parallel, the learners declare that they are progressively more and more at ease with this tool all along the weeks.
- The percentage technological tools users to edit in a collaborative way highly increases after the trials. The "Wiki" generally is the service associated with collaborative edition after the implemented activities.

Representations on technologies enabling knowledge management, interactions and production of documents

Their representations did not change a lot for some aspects, but they are reinforced:

- ICT are unanimously considered as increasing interactions and this representation does not change. The possibility of capitalizing resources and knowledge is recognised as well as that the recourse to technologies allowing adoption of standards enabling them to exchange documents without problem. We observe the same tendencies (but reinforced) in the post-test.
- They think that the ICT can contribute to capitalise resources and knowledge, to adopt standards offering the exchange of documents, to conduct a debate generally leading to structure knowledge, to create a community to which be identified and to increase the social interactions within a group.
- Two concepts are unknown by all the members in the pretest: ontology and folksonomy. After a few months, they are part of more than two thirds of the CoPs' members' vocabulary.
- Some software functionalities (e.g. style sheets, templates, "follow up of modifications", tags…) are not well known and then not used before the trials.
- To tag and create themselves Web pages represent tasks little frequently carried out by TICEF CoP's members. At the end of the trials 35 pages were created and used by this CoP.
- BayFac is considered interesting since it provides them a common space where they can post and consult various documents. It contributes to capitalize resources and to constitute a collective database.

ISBN 978-1-86220-225-2

Collaborative learning

The 'collaborative learning' (CL) concept representation does not evolve a lot but is more concrete:

- The definitions given by CoPs' members changed a little bit. Concepts of "co-construction" or "sharing" given by TIC-EF members evolve to a type of groupwork starting from a common topic and including a facet of "mutual learning" through confrontations of ideas. The majority of the TIC-FA members define CL as an exchange of ideas with an aim of learning with others. Other consider CL as a project conducted in group where people work together around a shared interest. Comparing the representations of the two CoPS in the pretest, we notice that sharing for TIC-FA CoP is mainly centred on sharing ideas whereas for TIC-EF CoP it is more on the documents, knowledge and experiments. But, the notion of project is common to the two CoPs. And in the post-test, the representations of the two CoPs seem to join and be more homogeneous.
- Collaborative work is clearly most envisaged with the support of ICT in the post-test.
- Their positions about twelve proposed characteristics of CL (e.g. presence of a tutor, deadlines, autonomy…) show that in the pretest, the quasi totality of the TIC-EF CoP declares that CL implies a definition of precise roles and an allocation of functions by the participants. They also admit the need for negotiating functioning rules and for specifying clear stages while leaving certain autonomy to each one (but not a total freedom). Moreover, almost all the learners think that CL requires to define deadlines and to maintain regular contacts with the other members. Those contacts are managed by a mediator or a tutor as well as supported by ICT use. The representations are almost the same in the post-test even if they more often "agree" or "completely agree" with the items than in the pretest. Nevertheless, around ¾ of learners disagree in the pretest with the idea that the production of a good quality collaborative work takes less time than an individually work. They also more declared in the postest that it is not essential to work only with familiar people to be effective.
- Activities sustained by CoPe_it! made evolve the representations about collaborative learning since they discovered different modes of exchanges (e.g. graphical visualisation of the debate).

Perception about the production of documents and collaborative edition

The trials made evolve the representations of the learners on collaborative edition (CE):

- The positive perception is reinforced about documents production (e.g. interesting, constructive…) and some negative connotations (e.g. time consuming, constraining, restrictive) disappeared about CE.
- Representations about possible tasks that can be sustained by collaborative edition software evolve. Items concerning sharing, reification, interoperability… are now better understood (meaning and accuracy).
- Concerning the SweetWiki service (SW), many assets are expressed by the TIC-EF CoP members. First, they had a rather 'negative' representation regarding CE and more particularly Web pages' creation. They believed this task was very difficult. The use of SW allowed the learners realizing that the creation of a Web page with this service does not require a great knowledge and ICT mastery. Moreover, the majority of accounts express a certain pride related to their page creation. The CoPs' members (re)take self-confidence; the use of SW eliminates or decreases certain fears (fear not to be able…) with regard to ICT. It also allowed them to refine their representations on CE and make sense to it. They also frequently mentioned that it favourably took part in the construction of the feeling of belonging to a CoP. The concerns related to the use of this service refer more to this mode of exchange and edition rather than to the service itself. Indeed, the learners are afraid to edit documents by fear of the other member's opinion.
- Recurrent logbooks comments showed that SW is perceived in a positive way by the learners and notably thanks to its usability. But the lack of awareness when something has been modified is criticised as well as the impossibility for several users to edit simultaneously the same page.

Conclusions and recommendations

Changes observed in the representations and the development of new practices among two "CoPs" following the use of some PALETTE artefacts showed an evolution at various levels: ICT competencies (practice and literacy) increased, attitudes towards ICT became more positive, feeling of becoming a CoP emerged. They built their identity and shared common interests, resources and strategies to reach the course objectives. Their motivation was not only extrinsic (succeed in the course), but was enhanced by the evolution of the group cohesion and the meaning of the activities. Those were useful for their professional development: they acquired some expertise in the field of education and training sustained by ICT tools. They actually produced documents individually and

ISBN 978-1-86220-225-2

collaboratively, classified or retrieved some of them using facets or tags. Within the proposed scenarios they usually used the artefacts in the way prescribed by the developers.

Some factors seem important if we want to transfer this kind of scenarios in other contexts. Firstly, it is important to integrate the PALETTE tools or services uses in the relevant and current activities or practices of the CoP members. These activities must be related to the domains and usual tasks of the CoP. It is through a contextualization that these artefacts get sense, so this mainly supports their utility perception and acceptability.

Then, the artefacts appropriation depends on the previous experiments and on the ICT mastery level. The CoPs' members tend to use some known tools and especially those with which they have a positive experience. Some resentment often comes from the results they obtain during the artefacts uses but also from the environment (atmosphere…) in which these tasks were undertaken. So the importance to clarify the utility of the artefacts uses according to a type of task and to be attentive the users have the right representations about that.

The discovery of different artefacts allows to the CoP members to become familiar with them and to develop transversal competences on ICT use. It expands their computer literacy. Moreover, the frequency of use is also essential to influence the tools appropriation and acceptability. In other words, more the CoP members use the tools and services in a regular way, more they adopt them and more easily they accept them into their practices.

Lastly, the CoP members must be supported in their appropriation of the new artefacts. Two means seem to favour their use: the presence of a CoP animator and a preparation, a training in the tools or services uses.

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ISBN 978-1-86220-225-2