

## Self-Development of Competences for Social Inclusion Using the TENCompetence Infrastructure

Amélie Louys<sup>1</sup>, Davinia Hernández-Leo<sup>2</sup>, Judith Schoonenboom<sup>3</sup>, Ruud Lemmers<sup>4</sup>, Mar Pérez-Sanagustín<sup>2</sup>

<sup>1</sup>Association of Participants Àgora, C/Selva de Mar, 215 5<sup>a</sup> planta, 08020 Barcelona, Spain // Tel.0034933086614 // Fax. 0034932660781 // agora@edaverneda.org

<sup>2</sup> ICT Department, Universitat Pompeu Fabra, Estació de França, Passeig de Circumval.lació 8, 08003 Barcelona, Spain // Tel.0034 935421428 // Fax. 0034935422451 // {davinia.hernandez, mar.perez}@upf.edu

<sup>3</sup>SCO-Kohnstamm Institute, University of Amsterdam, P.O. Box 94208, NL-1090 GE Amsterdam, The Netherlands // Tel: +31-20-5251520 // Fax +31-20-5251200 j.i.schoonenboom@uva.nl

<sup>4</sup>LOGICA, Robert Schumann domein 4 6229 Maastricht, The Netherlands // Tel. 00433524200 // Fax. 0031433524004 // ruud.lemmers@logica.com

### ABSTRACT

This paper describes a pilot study centred on the technology-enhanced self-development of competences in lifelong learning education carried out in the challenging context of the Association of Participants Àgora. The pilot study shows that the use of the TENCompetence infrastructure, i.e. in this case the Personal Development Planner tool, provides various kinds of benefits for adult participants with low educational profiles and who are traditionally excluded from the use of innovative learning technologies and the knowledge society. The self-organized training supported by the PDP tool aims at allowing the learners to create and control their own learning plans based on their interests and educational background including informal and non-formal experiences. In this sense, the pilot participants had the opportunity to develop and improve their competences in English language (basic and advanced levels) and ICT competence profiles which are mostly related to functional and communicative skills. Besides, the use of the PDP functionalities, such as the self-assessment, the planning and the self-regulating elements allowed the participants to develop reflective skills. Pilot results also provide indications for future developments in the field of technology support for self-organized learners. The paper introduces the context and the pilot scenario, indicates the evaluation methodology applied and discusses the most significant findings derived from the pilot study.

### Keywords

Lifelong competence development, Self-organized learning, Social inclusion, Pilot study, Non-formal learning

### Introduction

The emerging knowledge society places new demands on individual workers, groups, and organisations. Central to these demands is the need to continuously develop and manage the competencies which provide competitive advantages (Koper, 2008). To achieve lifelong competence development there is a need for better integration of learning and knowledge dissemination facilities offered by the different knowledge support organisations in society, e.g., educational institutes, training departments, HRM support organisations, government, libraries, research institutes and others. The requirements placed on the models and technologies to support such integrated facilities differ considerably from those traditionally placed on technologies to support particular fragments of a learning lifetime, or to serve the knowledge dissemination and knowledge management needs of a company. One requirement is that such an infrastructure should support self-directed, self-organized learning, which is often seen as a main characteristic of lifelong competence development (Cheetham & Chivers, 1996) and of learning in adulthood generally (Knowles, Holton, & Swanson, 2005; Merriam, Caffarella, & Baumgartner, 2007)

The TENCompetence project is a four-year project in the European Commission's 6th Framework Programme, priority IST/Technology Enhanced Learning. The aim of the project is to design a technical and organizational infrastructure for lifelong competence development. The project develops new innovative pedagogical approaches, assessment models and organisational models, and it creates a technical and organizational infrastructure which integrates existing isolated models and tools for competence development into a common framework (Koper & Specht, 2006).

The TENCompetence infrastructure is validated in a number of different pilots, representing the variety of contexts in which lifelong competence development takes place (Schoonenboom et al., 2008a). The main research question underlying all pilots is: For whom does the TENCompetence infrastructure work in a variety of circumstances? More specifically, we want to know to what extent the use of the TENCompetence infrastructure leads to the kind of self-directed and self-organized learning that is typical for lifelong competence development. First experiments with highly educated people (Schoonenboom et al., 2008b; Moghnieh et al., 2008) showed that use of the TENCompetence infrastructure helped people in developing their competences, made them feel more in control of their own learning, and made a number of people change their preferred way of learning from following a pre-determined learning path in a strict order to being able to choose their own learning path.

In the Àgora pilot, we investigated to what extent these findings also apply to people with low educational levels who are working in a non-formal learning environment. The pilot took place in the context of the Association of Participants Àgora, which is a non profit association of adults who do not have any academic degree and are characterized by their intrinsic motivation to learn. The main goal of the association is to promote the educational and social inclusion of its participants grounded on democratic participation (Sánchez-Aroca, 1999; Flecha, 2005). This context is challenging in the domain of self-organized/self-directed learning as the lifelong learners involved have typically low educational profiles and have not always the necessary confidence to take the primary responsibility for the planning and performance of learning activities. In addition, we expect that these learners in general have low computer skills, which are probably too low to make sensible use of the TENCompetence infrastructure. Thus, we would expect that it would be much harder, if not impossible, to achieve lifelong competence development in the Àgora pilot, as participants (1) may not have the necessary planning skills for self-organized and self-directed learning, or (2) the necessary computer skills, and (3) in a non-formal learning context, it will not be possible to oblige participants to acquire these skills or to continue competence development.

The aim of this paper is to present the Àgora pilot and its results concerning the benefits of TENCompetence when applied to this special context. In order to reach the objectives of the pilot, the TENCompetence infrastructure was used so as to provide learners with a set of self-training functionalities to support their competence development process. In this framework, the participants were responsible for defining their own learning path including goal setting, self-assessment, planning and self-regulated learning among others.

The paper is organized as follows. In the first place, it describes the Àgora pilot presenting on one hand the challenging context of Àgora and on the other hand the pilot scenario and the TENCompetence usage profiles and tools applied. Secondly, the paper focuses on the description of the methodology employed for evaluating the pilot study, and as well as on the results and discussion of the main findings. Finally, the paper presents the conclusions of the pilot study.

## **Description of the Àgora Pilot**

### **Àgora context**

The Association of Participants Àgora, as part of *La Verneda-Sant Martí* Adult Education Centre, is an organization dedicated to the non-formal training of lifelong learners. Àgora, which is located in the Sant Martí district in Barcelona, provides a daily educational setting for about 1600 participants, more than 100 volunteers and ten hired staff. It has an extended opening time from 9am to 10pm from Monday to Sunday. All the activities offered are free-of-charge and include language learning (Catalan, English, German, Spanish, French, Arabic, etc), basic literacy, ICT training groups (Women and ICT; Towns of the world, etc), preparation for University access tests and dialogic literary circles among many other workshops. Àgora is based on democratic participation, opening all decision-making spaces to any participant of the organization. The participants are mainly adults who have been excluded from formal education, i.e. adults without any academic degree, young adults coming from scholastic failure, women, immigrants and people with special needs, and are characterized by their intrinsic motivation to learn. The general aim of Àgora is to promote their social and educational inclusion through the dialogic learning methodology, which focuses on the inclusion of the voice of all participants and based on egalitarian dialogue, transformation and solidarity among other principles (Flecha, 2005). In this line, one of the main challenges of Àgora is to explore new ways to support a wide range of competence development and knowledge sharing for adult lifelong learners.

Àgora has an extensive experience in the ICT sector, and since 1999 the association manages and administers an OMNIA located within the association (computer rooms distributed over Catalonia by the local government to facilitate access to ICT for those with difficulties to make use of them). The OMNIA computer room was provided as a result of the participants' *dream* of being part of the "information superhighway" and was achieved through their consensual decision to seek the necessary means to be fully integrated in the information and knowledge society (Sánchez-Aroca, 1999). The main aim is to promote the access to ICT for all the people of the neighbourhood. Another key objective of the computer room is to facilitate access and promotion within the labour market starting from the training (e.g.; learning to write documents, use the e-mail and search for information on the Internet efficiently) and the professional re-training (e.g.; keeping people with some professional experience up-to-date about recent developments in ICT). Eventually, one of the main priorities of Àgora is to use the ICT as a learning tool in all the courses offered, as for instance through the use of smart boards.

Finally, it is worth mentioning Àgora's policy in terms of competence development. Àgora mainly focuses on the development of functional skills by offering literacy, digital literacy and numeracy courses among others. In addition, the participants develop cognitive competences on the basis of the recognition of the knowledge acquired in informal learning contexts. Moreover, the education in Àgora is centred on the promotion of communication skills through the use of dialogic learning, as for example the organization of the classroom in interactive groups, in which the participants share knowledge and ideas rather than performing individual learning. The philosophy of Àgora is centred on values and ethical competences through the adherence to the Participants' Bill of Rights (FACEPA, 1999), which is an international reference document defining the social, democratic and participative model of adult education aimed at overcoming social inequalities. After having defined Àgora's context, the next section will describe in detail the Àgora pilot experience.

#### **Pilot scenario: Self-training of intrinsically motivated lifelong learners**

The Àgora pilot took place mainly in the OMNIA computer room (see Figure 1) of the association equipped with 9 computers and was carried out between mid-September and the end of October. The computer room was reserved for using the TENCompetence infrastructure during 14 weekly hours. Participants had also the possibility to use the TENCompetence tools whenever the OMNIA was free, including the week-ends and after the end of the pilot. Besides, the participants also use the tool at home. The main aim of the pilot was to implement, test and investigate the benefits of the TENCompetence infrastructure and its support for the participants' competence development. The ten competence profiles from which participants could choose included ICT (MS Word, E-mail usage, Internet, MS Power Point, Windows management, Files management, Folders management, Blogs usage) and English language (basic and advanced levels) . For each competence, participants could choose between several activities, ranging from 3 to over 20 activities per competence. One activity stands for between 15 minutes and 3 hours of learning.



*Figure 1.* Participants using the TENCompetence tools in the Àgora computer room

The pilot comprised more than 100 learners; 7 experts (Àgora staff) and 13 ICT collaborators (members of the Àgora ICT commission) and other Àgora staff interested in using the tool, apart from the researchers involved in the investigation. The wide range of adult learners who participated in the pilot varies in terms of age, gender, but also in the variety of needs and interests. Most of them have low academic levels and are characterized by their intrinsic motivation to learn. A TENCompetence expert was in charge of each of the self-training session to assist the users with any technical or content-related issue.

## TENCompetence usage profiles and tools applied in the pilot

A second version of the TENCompetence infrastructure was delivered in June 2008. This version consisted of the TENCompetence server and a client software package, called the ‘Personal Development Planner’ or PDP for short (Martens & Vogten, 2008; Koper, 2008). The pilot participants used the PDP as the central tool for the creation of their own personal development plans by selecting a competence profile, stating their goal and motivation, following a self-assessment, creating their learning plan and performing the activities in the plan (see Figure 2).

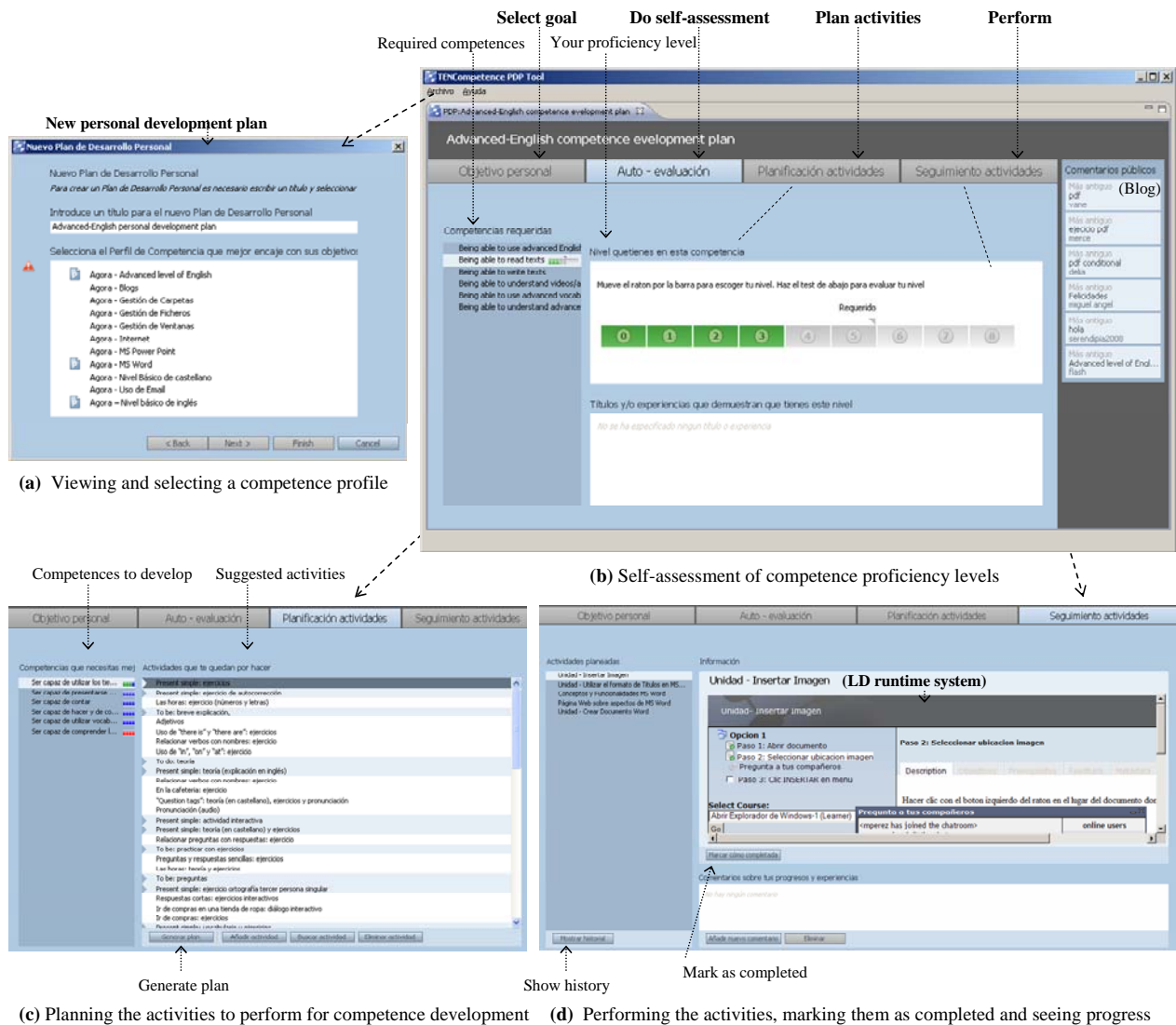


Figure 2. TENCompetence Personal Development Plan functionalities as experienced by Agora pilot participants (in Spanish)

Figure 2 (a) shows the PDP facility that allows learners to select one or more of the above-mentioned competence profiles. After specifying the goal and motivation of having selected a competence profile, learners could do a self-assessment as illustrated in Figure 2 (b). The self-assessment consists in a likert scale that enables learners to indicate a proficiency level for each competence (E.g., in Figure 2 (b) the user is indicating that s/he has a level of 3 out of 8 in the competence “Being able to read texts in English”). The competences have a target proficiency level, determined by the Agora experts beforehand, that must be attained to meet the requirement of the competence profile (in the case of the competence “Being able to read texts in English” as shown in Figure 2 (b) the target proficiency

level is 5). Figure 2 (c) shows the “plan activities” PDP functionality. Clicking the “generate plan” button the PDP automatically suggests a list of activities associated to the competences that the learner needs to develop (e.g., activities that facilitate further acquisition of English reading comprehension). This functionality takes into account that a learner may have a proficiency level beyond the targeted for the profile. When this is indicated in the self-assessment for one or more competences, the generated plan does not include the activities devoted to the already mastered competences. However, the current version of the PDP does not consider the specific proficiency level (when lower than required) for a more accurate recommendation of activities.

The planned set of learning activities can be performed in the PDP as illustrated in Figure 2 (d). The activities are shown on the left hand side panel of the screen. The right hand side provides details about the selected learning activity. This includes a descriptive text of the learning activity, which may include hyperlinks to external learning environments. In the Agora pilot some activities devoted to ICT competences, for example, were run in the TENCompetence LD runtime system (Sharples, Griffiths & Scott, 2008). The LD system is compliant with the IMS Learning Design specification (Koper & Oliver, 2005) and facilitates the provision of structured activities (similar to courses) that learners can follow as part of their competence development. Figure 2 (d) shows how the LD runtime system can be accessed through the PDP for the activities that make use of it. The PDP facilitates learners to reflect on the progress made by allowing them to mark an activity as being completed. The completed activities disappear from the list of activities to be performed (left hand side panel) but they can be checked again by clicking the button “show history”. Learners can also post public comments using the blog available in the PDP.

## **Evaluation of the Pilot**

### **Evaluation methodology**

The Agora pilot involved an authentic lifelong learning situation, in which participants in several sessions worked not only on their competence development, but also on mastering the software tools used for their competence development. Learners with varying backgrounds and characteristics worked on their competence development in a developing context, which changed from session to session. As a result, a simple pre- and post test alone would not be sufficient to capture this complex process of change. Therefore, an observational method in which data is collected as the pilot develops was applied (Zelkowitz & Wallace, 1998). In particular, a mixed evaluation methodology, combining the qualitative and quantitative data gathering techniques shown in Table 1, was followed (Creswell, 2003). Quantitative data were considered useful for showing tendencies. Besides, qualitative results were used to confirm or reject those tendencies, to understand them, and to identify emergent outcomes in the specific situation under study (Goubil-Gambrell, 1991).

As indicated in the Introduction, the main goal of the pilot is to investigate to what extent and how the TENCompetence infrastructure ‘works’ for people with low educational levels who are working in a non-formal learning environment and who have not the necessary confidence to take the primary responsibility for the planning and performance of learning activities. ‘Does the TENCompetence infrastructure work’ was operationalized as much as possible in the same way as in previous pilots, which used questionnaires, but additionally qualitative data were collected and log file analysis was performed. As in earlier pilots, the general research question was split into four different sub questions. Below, we describe for each sub question how it was operationalized.

The first question is on the participants’ background. In a pre-test we collected information on participants’ age, gender, country, education, profession, level of expertise on the pilot competences, experience with web-based and competence-based learning, and reasons for following the pilots. The preferred way of learning was measured in the pre-test by asking participants whether they preferred to be guided entirely by the system, to receive suggestion from the system on planning their learning path, or to be provided with learning resources only.

The second question is to what extent and how participants made use of the functionalities provided by the TENCompetence infrastructure. These functionalities included self-assessment, activity planning and selection, performing learning activities on the SLED server, marking activities as completed, blog entries and other means of interaction. In a post-test, a variety of questions was asked, depending on the nature of the functionality, which included: whether, how much, how, for what purpose participants used it, if they did not use it, why not, the difficulty and appreciation of using it and the use of alternatives (blogging only). We asked participants to fill in a

number (how much), or used closed questions with either a yes/no question (whether), a five-point Likert scale (how much, difficulty, appreciation) or a list of alternatives (for what purpose, why not, use of alternatives). Further, we asked whether their learning was hindered by technical problems. An example question is: How would you rate the possibility to mark activities as completed? (very useless..... very useful).

*Table 1.* Data sources for the evaluation of the pilot and labels used in the text to quote them

Data source	Type of data	Labels
Questionnaires before (pre-test) and after (post-test) the pilot experience	Quantitative participant characteristics, expectations and evaluation.	[pre-test] [post-test]
Observations during the pilot	Record of observations (technical issues, about the activities, interactions with experts and other participants, behaviour, other incidents, etc.) The observations were done by 6 different experts (Àgora staff, UPF researchers)	[observerX-date], where X represents different observers (from 1 to 6) and date is the specific date when the observations were done
Focus group with participants	Qualitative: participants' opinions two weeks before the end of the pilot	[focus-participants]
Focus group with experts	Qualitative: experts' opinions two weeks before the end of the pilot	[focus-experts]
Log files	TENCompetence server logs, analysis of 512 sessions (a session is considered one usage period of a user from login to logout)	[logs]
Description of the Àgora context	Qualitative descriptions of the context characteristics in which the pilot is framed (see "Description of the Àgora pilot")	[context]
Observations post-pilot	Records of opinions and observations of what was being perceived in Àgora once the pilot had finished (collected by Àgora staff)	[observations-post]

The third question is to what extent the use of the TENCompetence infrastructure contributed to lifelong competence development. In the post-test, the following four closed questions were asked, related to different aspects of lifelong competence development:

- (1) How many hours did you spent and (2) how many activities did you complete within each competence profile (estimation)?
- (3) How much have you learned with respect to the following types of competences (knowledge, functional skills, social skills, knowing how to guide their future use)?
- (4) Do you wish to continue developing this competence / these competencies further?

Aspect two and three were measured using five-point Likert scales ranging from 'almost nothing' to 'very much' and from 'certainly' to 'certainly not' respectively. For each competence profile in question one, five answer alternatives were presented, depending on the total number of activities available within the competence profile involved.

The fourth question considers the appreciation of the type of learning offered by the TENCompetence infrastructure. One overall statement was presented: 'I enjoyed this way of learning'. Further, three scales were developed that measured the appreciation of the learning resources, the appreciation of collaboration with other participants and the amount of control over their own learning that participants experienced. Each scale contained a number of statements, to which the participants could indicate on a five-point Likert scale to what extent they agreed with the statement.

The scales on the appreciation of collaboration with other participants and the amount of control of their own learning turned out to be very reliable (Cronbach's alpha of .86 and .82 respectively). As Cronbach's alpha of the appreciation of the learning resources was only .64, the items of this scale were treated separately and not as one

scale in the analyses. On the questionnaire data, descriptive analyses were performed, and the resulting percentages of participants that chose a particular answer alternative were used as the input for the triangulation (Guba, 1981; Creswell, 2003).

The log files generated by the TENCompetence infrastructure also provided quantitative data on the time spent and the PDP functionalities used by the participants (Glahn et al., 2008). The quantitative results are complemented with the qualitative observations gathered by six different observers throughout the whole pilot in Àgora computer room (see Figure 1). Post-observations were also collected in order to understand the informal reactions of the participants when reflecting about the pilot outcomes. Two different focus groups that addressed both participants and experts separately were conducted two weeks before the end of the pilot following the critical communicative methodology typically used in Àgora (Flecha, 2005; Renshaw, 2004). In this way, the focus group consisted of a group of people discussing in equalitarian terms towards understanding the benefits and limitations of the TENCompetence tools and approach applied to the pilot. The researcher is one more person in the group and adopts a listening attitude.

In the triangulation process, from the juxtaposition of the separate answers on the survey questions and the separate pieces of the qualitative data, we sought for meaningful relations that would summarize or explain the specific configuration of results that we found. To take the first insight that we thus found (see Table 2) as an example, we identified the diverse and relatively low level of education, the low experience with competence-based training, the divergent experience in using the computer, and the technical problems that participants experienced as factors that might have hindered their involvement in the pilot. Then we observed that most of the participants completed the pilot experience, and a large majority of the participants including the less experienced used most of the PDP functionalities, and we concluded that these possibly hindering factors in this pilot actually did not really hinder competence development, or that people maintained full use of the pilot possibilities *despite* these hindering factors.

## Results and discussion

Table 2 summarizes the findings and partial results after evaluation. The results are discussed in more detail through this section. The first finding evidences that a pilot centred in technology supported self-training can be successful despite the diversity in the participants' background even when most of them have low educational levels. The quantitative results of the [pre-test] indicate that there were a total of 104 participants, comprising 68 women and 36 men. Some of them did not complete primary school (5%) others did complete primary school (22%), secondary school first stage (12%), secondary school (20%), higher vocational education (18%), and obtained an university degree (12%) [pre-test]. This data can also be explained by the [context] of Àgora association as it is mainly addressed to people with low academic degrees. In general, the computing skill and the experience of participants with competence-based training are low, i.e. 61% of the participants either had never followed a competence-based training, or didn't know what competence-based training was [pre-test]. The low educational level of the participants did not prevent them from completing the pilot experience as was shown by the 82 participants who filled in the [post-test] questionnaire. After verifying with the participants themselves, the non-attendance of the 22 remaining participants in the last session of the pilot was mainly due to health problems; the preference to use the PDP at home and at a lower scale because of the difficulties in using the computer [observations-post]. In addition, the [post-test] indicates that the extent to which the learning process was hindered by technical incidents (e.g., Internet down or small windows interface to perform the activities) differed among the participants, i.e. that 35% was hardly hindered or not at all, 41% was moderately hindered and 24% was completely hindered. However, it was observed that the technical issues that arose in the pilot were not a barrier for the participant learning progress as observed by an expert *"...in general, the participants show satisfaction and are in favour of continuing to learn despite of the technical failures that may occur [observer3-08/10/2008]."*

Table 2. Main conclusions offered by the research carried out along the pilot

Findings	Partial results	Support data
1. Technology supported self-training can be useful and beneficial despite the diversity in the participants' background, even when most of them have low	Although participants' educational levels is very diverse (the large majority not having any higher education degree), their experience with competence-based training is low and they have a divergent experience using the computer: - most of them completed the pilot experience;	Based on the analysis of the pre-test, post-test, context, observations and log files.

educational levels.	<ul style="list-style-type: none"> <li>- the technical issues did not hinder the participants' involvement; and</li> <li>- a large majority of the participants including the less experienced in using computers used most of the PDP functionalities.</li> </ul>	
2. Participants appreciated this new way of self-organized learning.	<p>Prior to the pilot the participants had a preference for the traditional way of learning and therefore the pilot centred in self-organized learning meant a change in their learning habits. They did not spend much time on personal competence development but:</p> <ul style="list-style-type: none"> <li>- they were very active and used quite often the main elements of the PDP tool;</li> <li>- they enjoyed the possibility to work at their own rhythm, to choose the activities in accordance to their interests and needs;</li> <li>- they asked to continue self-developing competences at home.</li> </ul>	Pre-test, post-test, focus group with participants and observations during and after the pilot support these results.
3. The experience fostered the participants' reflection and self-confidence.	<ul style="list-style-type: none"> <li>- The self-assessment functionality encouraged the participants to reflect on new learning possibilities and on previous experiences.</li> <li>- The participants' felt that they developed social and reflective skills apart from the functional skills more related to the learning resources provided.</li> <li>- The large majority of the participants let the system generate a plan based on their self-assessment and had high expectation with regard to this functionality.</li> <li>- The participants valued positively the potential of controlling their learning progress and being aware of their evolution.</li> <li>- The self-assessment functionality had an effect on the participants' motivation as they realised what things they are able to do.</li> </ul>	Supported by post-test, observations, focus groups with participants and experts
4. The participants discovered further competence development opportunities.	<ul style="list-style-type: none"> <li>- The participants found out that they could develop more competences thanks to the competence profile list provided by the PDP tool.</li> <li>- They did not only want to develop a concrete competence available in the system but others they did not think of before the pilot.</li> </ul>	Based on the post-tests, observations focus with participants and log files.
5. Recommendations for the improvement of self-organized learning technologies include more interactive and communicative functionalities, feedback and automatic assessment support, and more sophisticated approaches in the recommendation and organization of personal development plans.	<ul style="list-style-type: none"> <li>- The participants had a clear preference for the interactive activities and feedback provision (such as it can be done with LD runtime system).</li> <li>- The users expressed the need to be able to submit assignments and posing questions to experts or other learners.</li> <li>- Some participants also requested to take a test in order to define more objectively the proficiency level in the self-assessment phase.</li> <li>- It is important to provide different ways of organizing activities within personal development plans.</li> <li>- The users expect recommendations based on their personal needs (such as taking into account the proficiency level when suggesting activities).</li> </ul>	Observations during and after the pilot, post-tests and focus group with participants lead to these recommendations.

As a conclusion, the partial results underlying this first finding indicate that neither the little experience in competence-based training and in the use of computer in general nor the technical problems hindered the self-



learning process of the participants. Another partial result supporting this statement indicates that a large majority of the participants, including the less experienced in using computers employed the main elements of the PDP tools quite often in the sessions as evidenced by the [logs], “the description of an activity” (action) was checked an average percentage of 93% of all sessions. Users worked on 2.5 learning activities per session. In the sessions, the users have inspected around 9 competence development plans and added 5 new plans [logs]. Eventually, it was observed that “*All participants asked when the next pilot will be. They want to continue developing competences* [observer6-31/10/2008].”

The second finding highlights that the participants appreciated the self-organized learning concept, nevertheless, they did not spend much time on personal competence development (74% spent between 4 and 8 hours [post-test]). A partial result stressing this conclusion also considers that the participants had to change their learning habits as they were mostly used to a traditional way of learning. Only a 38% of the participants stated before the pilot a preference for searching in the system by themselves what they wanted to learn [pre-test]. However, even if some participants found it difficult at the beginning and needed continuous support by the experts to be able to use the different PDP functionalities, they managed to be more and more autonomous and to appreciate this new way of learning [observations-all]. The participants themselves commented in the [focus-participant] group “*We want to go on... At the beginning, it was hard but now I am starting to enjoy this way of learning.*” In addition, as indicated in [post-test] around 54% enjoyed this way of learning very much and a large majority of 83% wants to continue to develop this competence further in the future. Qualitative results show which elements of the self-competence-development training and in this case of the PDP tool were mostly appreciated. For instance, the participants found useful the possibility to work at their own rhythm, to be able to choose activities in accordance to their needs and interests. The [post-test] also indicates that the self-assessment functionality was highly appreciated as 78% of the participants used it for most or all of their competences. Moreover, the appreciation of this way of learning was also observed in the self-training sessions, when a large majority of the participants who have Internet access asked to install the PDP tool at home in order to continue self-developing competences [observations-post, observers-all]. This statement is supported by the [post-test] results indicating that 63% of the participants use the Personal Development Planner at home, which correspond with the percentage of users who have Internet access. Eventually after the pilot experience, the participants still show interest in the PDP tool “*After the end of the pilot, the participants continue asking for the PDP to be installed at home* [observations-post].”

Furthermore, the third major finding refers to the reflection process of the participants and the self-confidence generated by this learning experience. A partial outcome resulting from the quantitative data indicates that the participants learned mainly about reflective skills (40% stated that they have learned much or very much on knowing how to guide their future learning by reflection on current practice [post-test]) as different elements of the PDP tool supported this aspect. A second partial result refers to the self-assessment functionality, which is one of the PDP tool elements that proved to enhance the learners’ reflection process. On one hand 78% of the participants used it for most or all their competences and a large majority of them (88%) let the system generate a plan based on their self-assessment [post-test] and thus had high expectation with regards to this possibility. However, this functionality in the current PDP version is very rudimentary and need to be further developed to guarantee a more detailed planning of the activities taking into account the users’ interest and prior experience. “*After the self-assessment, the participants had high expectations of obtaining a personal plan* [focus-experts].” “*It promotes autonomy. Participants are their own teacher: create their own plan, self assess... But it would be nice that the generated plan actually takes into account the profile of the participants, i.e. what they already know* [focus-experts].” This statement was also observed during the training session “*One thing to be improved in the system is that it generates a plan in accordance with the self-assessment* [observer4-1/10/2008].” Moreover, the learners themselves underline that the self-assessment element encourage them to reflect on their own learning. “*We find it useful to be able to reflect on our own level of proficiency* [focus-participants].” This has shown to have positive consequences on the participants’ self-confidence as agreed by the pilot experts in the focus group “*...the functionality of self-assessment is motivating for the participants who think they don’t know anything* [focus-experts].” Moreover, another functionality of the PDP tool which promotes the reflection process of the learners is the possibility to mark the activities as completed and have an overview of all the activity history. These elements entail another partial result of the evaluation, which is the control of the learning process and being aware of the participants’ evolution. 86% of the participants evaluated as very useful the possibility to mark activities as completed, only 4% found it useless [post-test]. Participants and experts share these views: “*I find it useful to follow my own personal plan and see the record of my achievements* [focus-participants].” “*It is motivating for them since they can see their progress* [focus-experts].”

The fourth finding is closely related to the previous one as the reflection process resulting from the use of different elements of the PDP tool also implies the discovery of further competence development opportunities. A partial result supporting this statement shows that the learners found out at an early stage of the self-training sessions that they could develop more competences thanks to the competence profile list provided by PDP tool [post-test]. The [logs] files also support this result by indicating that the list of personal development plans was inspected in 67% of all sessions and that the description of “competence profiles” was inspected an average percentage of 90% of all sessions. This statement was also observed in the training sessions *“It happened that a group of learners who registered to develop English competences also decided that they would learn about ICT when they found out about that opportunity [observer2-06/10/2008]”*. Moreover, it was observed that the majority of the participants discovered what things they could learn and/or improve in the future [observations-post] and felt motivated by this opportunity. As the participants stated in the focus group *“It is fabulous, it opens the door to different learning possibilities...”; “It enabled us to discover more training opportunities (...)” “We want more competence profiles in the PDP tool” [focus-participants]*. In addition, the great majority not only wanted to continue developing a concrete competence in the future but also other competences that they did not think of before starting the self-training. *“A participant who completed all the activities related to the PowerPoint competence profile found out that she wanted to learn how to add sound on her presentation and how to send it by email [observer2-06/10/2008].”*

Last but not least, the fifth finding points out the different recommendations emerging from the pilot experience and which would contribute to the improvement of self-organized learning technologies. One of participants’ main remarks resulting from the self-training experience is their preference for the interactive activities which allow them to perform the activities directly on the system and to receive a feedback on their actions. This need is perceived by all the pilot actors. *“Regarding the activities on a PDF format, the participants ask for the possibility to fill in directly their answers [observer5-25/09/2008].” “They do not like to have to write down on a separate sheet the answers to an exercise and thereafter checking the answers in the solution part [observer6-26/09/2008].” “I prefer when the activities are interactive [focus-participants].”* The [post-test] also suggest this conclusion as 16 out of the 18 participants using the ICT activities run by the LD runtime system had a preference for the interactive guidance provided by this tool. Moreover, another recommendation is the existence of a facility within the tool that allows submitting assignments and posing questions to other learners or experts. This need was observed by the participants in the focus group *“Comments or advice of other participants of how to use the tool would also help us to use it” and “When using the PDP at home, the blog might be used to resolve doubts”. [focus-participants]”* and also after the completion of the pilot *“Participants mentioned another utility the blog may have. Some participants indicated the need to use a chat to be able to pose technical or content-based questions to a specialist [observations-post].”*

Furthermore, the evaluation results stressed the importance in the definition of the self-assessment tool functionalities. In this sense, some participants requested an additional element enabling a prior test in order to define more objectively their proficiency level (e.g., taking a test in the self assessment phase). As a participant mentioned *“a more objective evaluation is also needed... [focus-participants].”* In addition, the participants had high expectation with regards to the recommendations generated by the system based on their prior experience and personal needs. As observed in a self-training session, *“One thing to be improved in the system is that it generates a plan in accordance with the self-assessment [observer6-26/09/2008].”* This statement was supported by the users view *“After the self-assessment, participants had high expectation of obtaining a personalized plan [focus-experts].”* The high percentage of participants (88%) who let the system generate a plan based on their proficiency levels also reflects this need [post-test].” Eventually, the importance of providing different ways of organizing activities within the personal development plans in the performance tab of the PDP tool was also mentioned by all the pilot actors. *“We experienced difficulties in the “perform tab” as the activities listed have no real meaning between them. The participants were expected that the activities generated would be logically linked together (in a certain order, such as alphabetically, or category, such as by competence). Another organization of the plan is necessary [observer1-15/10/2008].” “There should be an index [focus-participants].” “The participants ask each other where to find the activities with audio as they are not ordered in a specific way [observer3-15/10/2008].”*

## Conclusion

This paper has presented a pilot study that investigates the benefits of the TENCompetence infrastructure for supporting competence development in the Àgora non-formal context where learners have low educational levels. More than 100 pilot participants used the TENCompetence PDP tool to create and perform their personal

developments plans associated to competences profiles for social inclusion. The results of the pilot are very encouraging for the research domain for self-organized/self-directed learning technologies and for the enhanced support of lifelong learning situations involving people with low educational profiles.

The pilot has shown that the TENCompetence infrastructure can be successfully applied in the challenging context of Àgora. Contrary to our expectations, it turned out that the participants, even if they did not have the necessary computer skills or planning skills beforehand, were able to acquire and use these skills, and enjoyed this. The PDP offered participants a new way of learning which fostered their self-organization and increased their motivation. The tool made participants discover competence development opportunities, what which led them to create several competence development plans associated to different profiles of competences. The pilot meant a relevant change in the Àgora context. It was observed how participants' confidence to take the responsibility for the planning and performance of learning activities increased along the pilot. Moreover, the PDP support for goal setting, self-assessment and progress control was seen as particularly positive for promoting participants' reflection and awareness of their own learning. It was this change not only in abilities, but also in mindset that enabled participants to continue their activities in the pilot, despite the technical and other problems that they experienced. Their reward was large, not only and not primarily by what they actually learned, but by discovering a world of further competence development opportunities that was opened up for them.

The main requirements for future learning technology developments that emerge from the pilot include improving the support for feedback and competence assessment, offering further functionalities for communication and knowledge sharing, and providing advanced approaches (within the PDP) for the recommendation and visualization of learning paths. The TENCompetence project is already working towards providing solutions for these requirements. Its outcomes will be applied and tested in Àgora next year. Àgora participants are really looking forward to the new pilot.

## Acknowledgements

This work has been partially funded by the European Commission in the TENCompetence project (IST-2004-02787). The authors especially thank the Association of Participants Àgora including all Participants, collaborators and volunteers, for their encouragement and dedication to the pilot. The authors would also like to acknowledge the contributions from other members of the GTI Group (especially, Javier Melero, Sergio Sayago and Patricia Santos), the OUNL (Christian Glahn and Marcus Specht), and other TENCompetence partners' members.

## References

- Cheetham, G. & Chivers, G. (1996). Towards a holistic model of professional competence. *Journal of European Industrial Training*, 20 (5), 20-30.
- Creswell, J. W. (2003). *Research design: qualitative, quantitative, and mixed method approaches* (2 Ed.), Thousand Oaks: Sage.
- FACEPA (1999). *Participants' Bill of Rights*, retrieved December 15, 2008 from <http://www.facepa.org/PDF/EN/Declaeng.pdf>.
- Flecha, R. (2005). *Sharing Words*. (3 ed.). Lanham, M.D: Rowman & Littlefield.
- Glahn, C., Specht, M., Schoonenboom, J., Sligte, H., Moghnieh, A., Hernández-Leo, D. Stefanov, K., Lemmers, R., & Koper, R. (2008). Cross-system log file analysis for hypothesis testing. *Proceedings of the 4th TENCompetence Open Workshop "Empowering Learners for Lifelong Competence Development: pedagogical, organisational and technological issues"*. Madrid, Spain, 10-14.
- Goubil-Gambrell, P. (1991). What do practitioners need to know about research methodology, *Proceedings of the Professional Communication Conference*. Orlando, USA, 243-248.
- Guba, E.G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication and Technology: A Journal of Theory, Research, and Development*, 29 (2), 75-91.
- Martens, H., & Vogten, H., (2008). TENCompetence Personal Development Planner 0.9.3. TENCompetence software and documentation, retrieved December 15, 2008 from <http://dspace.ou.nl/dspace/handle/1820/1545>.

- Moghnieh, A., Hernández-Leo, D., Navarrete, T., Santos, P., Blat, J. (2008). Supporting Distance Learning Activities and Social Interaction: a Case Study. *Proceedings of the 8th International Conference on Advanced Learning Technologies*, Santander, Spain, 801-805.
- Knowles, M. S., Holton, E. F., & Swanson, R. A. (2005). *The adult learner: the definitive classic in adult education and human resource development* (6th ed.). Amsterdam: Elsevier.
- Koper, R. (2008). Building The European Network for Lifelong Competence Development. Keynote *Presentation at the 5th TENCompetence Open Workshop "Stimulating Personal Development and Knowledge Sharing"*. Sofia, Bulgarian. Retrieved December 15, 2008 from <http://dspace.ou.nl/handle/1820/1529>.
- Koper, R., & Olivier, B. (2004). Representing the Learning Design of Units of Learning. *Educational Technology & Society*, 7 (3), 97-111.
- Koper, R., & Specht, M. (2006). Ten-Competence: Life-Long Competence Development and Learning. In M-A. Cicilia (Ed.), *Competencies in Organizational e-learning: concepts and tools* (pp. 234-252). Hershey: IGI-Global.
- Merriam, S. B., Caffarella, R. S., & Baumgartner, L. (2007). *Learning in adulthood: a comprehensive guide*. San Francisco: Jossey-Bass.
- Renshaw, P. D. (2004). Dialogic learning and instruction: Theoretical roots and analytical frameworks. In van del Linden J. & Renshaw P. (Eds.), *Dialogic Learning: Shifting Perspectives to Learning, Instruction, and Teaching*. Dordrecht, Netherlands: Kluwer Academic Publishers, 1-15.
- Sánchez-Aroca, M., (1999). La Vermeda-Sant Martí: A school where people dare to dream. *Harvard Educational Review*, 69 (3)320-335
- Sharples, P., Griffiths, D., & Scott, W. (2008). Using Widgets to Provide Portable Services for IMS Learning Design. *Proceedings of the 5th TENCompetence Open Workshop "Stimulating Personal Development and Knowledge Sharing"*. Sofia, Bulgarian.
- Schoonenboom, J., Sligte, H., Moghnieh, A., Hernández-Leo, D., Stefanov, K., Glahn, C., Specht, M., Lemmers, R., (2008b). Supporting life-long competence development using the TENCompetence infrastructure: a first experiment. *International Journal: Emerging Technologies in Learning*, 3, 53-59.
- Schoonenboom, J., Sligte, H., Moghnieh, A., Specht, M., Glahn, C., & Stefanov, K. (2008a). Pilot evaluation in TENCompetence: a theory-driven model. *Proceedings of the 3rd TENCompetence Open Workshop "Current Research on IMS Learning Design and Lifelong Competence Development Infrastructures"* Barcelona, Spain, 43-49.
- Schoonenboom, J., Sligte, H., Moghnieh, A., Hernández-Leo, D., Stefanov, K., Glahn, C., Specht, M., Lemmers, R., (2008). Supporting life-long competence development using the TENCompetence infrastructure: a first experiment. *International Journal: Emerging Technologies in Learning*, 3, 53-59.
- Zelkowitz, M. V., & Wallace, D.R. (1998). Experimental models for validating technology, *IEEE Computer*, 31 (5), 23-31.