A conceptual framework to design and support self-directed learning in a blended learning programme.

A case study: the DES-TEF

Brigitte Denis
Service de Technologie de l'Education
University of Liège (Belgium)
B.Denis@ulg.ac.be

Published inJournal of Educational Media, Special Issue. Blended Learning: blending the issues and concerns of staff and stududents, Vol. 28, N°2-3, October 2003, 115-127.

Abstract

This paper relates different strategies developed in order to support the learning process in a blended learning programme involving adults from different backgrounds who are interested in the use of Information and Communication Technologies for Education (ICTE). Referring to Carré & Pearn's model of the seven pillars of self-learning, the author describes some principles, tools and resources that have been developed within the framework of a postgraduate diploma and that could be extended to similar adult training programmes.

Keywords

Blended learning, evaluation, portfolio, logbook, self-learning, educational technology, adult, ICT.

A. Context and epistemological framework

The development of a virtual campus and blended learning systems change the way learners learn. We shall consider here a programme devoted to adults who want to specialise in the field of educational technologies. At the University of Liège (Department of Educational Technologies) we have several years' experience in the design and the management of blended learning programmes. For instance, we have been involved in the design and the management of the Learn-Nett campus since 1997[1] (Peeters et al, 1998 ; Denis 2001 ; Charlier & Peraya, 2003). More recently, we have worked with another Belgian university and developed jointly a postgraduate diploma in educational and training technologies called "Diplôme d'Etudes Spécialisées en Technologie de l'Education et de la Formation (DES-TEF)[2]. The curriculum of DES-TEF includes 300 hours of activities: some are face-to-face, others at a distance. The participants are adults from different disciplines who are experienced in training and interested in the use of ICTE (Information and Communication Technologies for Education).

The pedagogical and espitemological principles on which the activities are based are mainly socio-constructivism (Bruner, 1996; Doise & Mugny, 1981; Perret-Clermont, 1979, …) and collaborative learning (Henri & Lundgren-Caroyl, 2001). Our goal is to enhance an active pedagogy so that the learners experience a meaningful apprenticeship linked to their project (Freinet, 1977) and will be able to transfer and develop what they have learned in their professional life. Their proximal zone of development will be modified (Lewis, 1996). The "isomorphism" principle contributes to this goal: we try to offer the participants learning experiences and methods that we would like them to propose to their own learners, for

[1] See http://tecfa.unige.ch/proj/learnett/
[2] See http://www.ulg.ac.be/ste/destef/

instance distance learning turned to different teaching/learning paradigms (Denis & Leclercq, 1994).

B. Pillars and challenges of a blended learning system

1. A conceptual framework to support the design and regulation of e-learning systems

E-learning is a new field compared to 'traditional' self-directed learning (SDL). But we think there are many similarities between them and that we could benefit from theoretical principles and lessons learned from SDL to support the learners in a blended learning system. In fact, to be a learner in such a training set-up implies being a "good self-learner" (Leclercq & Denis, 1996) since learners have to manage the process themselves more than in a traditional face-to-face training system. They are less guided here and more responsible for their own learning. They have to identify their learning needs, to define a (personal) project that will help them to match their needs, to plan the learning process (objectives, methods, tools, deadlines, …), to analyse and regulate their learning process.

Referring to the model of the seven pillars of self-learning described in Carré (1990) and Carré & Pearn (1992), we shall consider these seven variables related to our blended learning programme and observe **how far this model related to self-directed learning is useful, relevant, operational and transposable to design and regulate e-learning systems**.

So we can ask ourselves if the DES-TEF is based on these 7 pillars and, more specifically, ask questions and subquestions related to these variables.

7 pillars of self-learning (Carré & Pearn, 1992)	**Subquestions linked to these variables**
1. A project oriented pedagogy	How do we take into account learners' needs? Are the learners motivated and diligent? Does the learning offered match the learners' goals?
2. A contractual arrangement	
3. A mechansism for induction and pre-training	What are the basic methodological principles of the DES-TEF? Is the programme compatible with their learners' learning styles and strategies? Does this programme take into account some 'individual variables' such as the technical prerequisites necessary for learners to use the electronic resources efficiently? …
4. New roles for trainers	Are the trainers' roles different from a traditional or SDL programme? Does it require a specific training? Who are the actors in a blended learning system and what are their roles?
5. An open training resources environment	What is the actual use and added value of the electronic resources? What is the strategy used to help the learners to understand the contents and the instructions about a task?
6. An alternating pace	How are the activities organised?
7. A triple level of follow up	How is the learners' follow up organised? Which tools are used to follow up the learners and regulate the programme? Are they useful?

The list of subquestions we propose in this table is not exhaustive. It just offers some trails to reflect on the design and implementation of our programme and to compare some aspects of blended learning with SDL.

2. Data collection and methods

In order to answer these questions, several methods or tools have been used in the context of the DES-TEF to gather data:

- **teachers' management committee**: the teaching staff meets regularly in order to talk about the problems encountered at the pedagogical and administrative levels. They use information coming from different sources: learners' portfolios and logbooks, questionnaires, interviews and focus groups to reflect on factors that influence the programme quality and efficiency (see Denis & Piette, 2003).
- **questionnaires**: during the first year, the students systematically answered a questionnaire at the end of each compulsory course (Piette, 2001a). This data collection had multiple goals (e.g. to collect information on the added value of the web support materials, their effective use, activities to be done at a distance, on the different teaching and learning methods proposed, on the use of ICT tools, etc.);
- **feedback sessions and collective debriefing**: a co-evaluation of the programme is possible through feedback sessions between instructors and learners to exchange feelings and experiences about the system and to discuss plans to adapt it;
- **learners' logbook**: written accounts of the learners' experience provide information not only at the individual level but also concerning the way the programme is implemented and perceived by the learners (Piette et al, 2001).

3. Contribution of the Carré & Pearn's model to the design and regulation of the DES-TEF programme

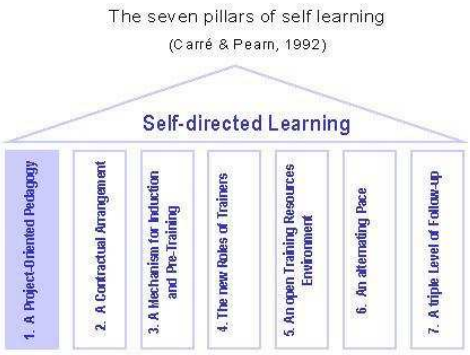
Let's now consider the possible contribution of the Carré & Pearn's model to the design and adaptation of our programme. Does it help to answer the questions asked above? Do we find the seven pillars of self-learning in the DES-TEF?

a) A flexible curriculum linked to personal projects

How do we take into account the learners' needs? Does the learning offered by the programme match the learners' goals? Are the learners motivated and diligent?

Since its creation, the programme of the DES-TEF has always been considered modular and flexible. This **flexible curriculum** permits the matching of the learners' existing competencies to the target profile they want to reach (pedagogical designer, training systems manager, on line tutor, multimedia product designer). Only two modules are common to all the participants[3]. Two optional modules are also available for people who do not have some basic skills either in pedagogy or in the use of ICT tools. To complete their curriculum, they choose among the courses offered in two main topics (design and realisation of multimedia products or design and evaluation of learning programmes using ICTE), but they may take some courses from both. This organisation of the curriculum in two main topics is new (before there were five axes). It is proposed for the next academic year and is the result of gathering information and discussing with the learners and the teachers during the feedback meetings organised each year in order to better adapt it to the learners' needs.

[3] http://www.ulg.ac.be/ste/destef/programme.htm



To be enrolled in the DES-TEF, the learners have to propose a **personal project** (individual or institutional) that will be their main idea all along their learning. This must be bound with the integration of ICTE in their professional practice. The whole training is assimilated through this project. To prepare the description of the project, we suggest that the participants fill in a form before having an interview with a coordinator of the DES-TEF. This tool supports the first step of the learning process.

Project form

Framework to elaborate your personal project with the help of a coordinator of the DES-TEF.

Here are some guidelines that could help you to define your personal project. Having such a project is mandatory for your enrolment in the diploma. This reflection should be prepared before your meeting with the coordinator from the chosen university. This meeting will help you to further specify and refine your project.

First name:

Last name:

Address:

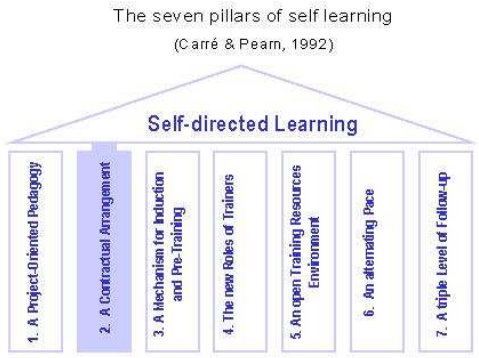
Current employment:

1. What are the characteristics of my project in educational and training technology: main goal, technologies used, target audience, assessment methods…?
2. What are my objectives in terms of apprenticeship and professional development?
3. How does this project fit into my professional life?
4. What professional support could I rely on?
5. What are the constraints and fears ?
6. What opportunities are there for experimenting and for putting my project into practice?
7. I have chosen the following orientation:
   Because…
8. However I would like attend the following courses in the other orientation:
   Because…
9. I think I should attend the upgrade training session in: training and learning / ICT.
   Because…

Figure 1 : Project form of the DES-TEF

This approach helps to check the adequacy between the learner's needs and the curriculum. Then, the participants can choose the courses directly related to their project and link their master of new competencies and tools to it. Coming from different backgrounds, the learners can apply concretely what they learn and also formalise their field experience. This principle respects the first pillar of self learning: a project-oriented pedagogy (Carré, 1990). An individual project means that the learner is actively involved in his/her learning. This project can also come within the scope of a global strategy of staff development, for instance of an organisation. During the regulation sessions and in their logbooks, most of the learners

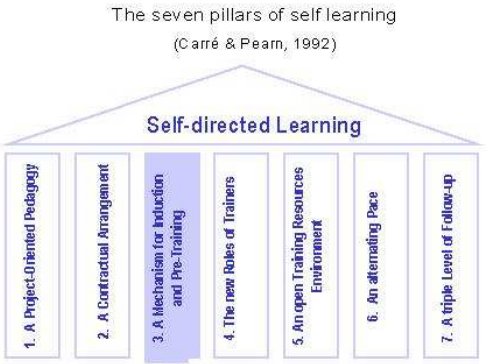
declared that this is helps to sustain their **motivation** and **diligence**. In the DES-TEF, learning is really self-directed or co-piloted by the learners (Kremers & Piette, 1999) so that the learners are and remain motivated. We can notice that more than eighty percents have got the diploma during the last three years.



Formalising a **learning contract** (Knowles, 1975) is one of the objectives of the discussion between the learner and several actors of the training programme and between the learner and his/her organisation. Here we try to formalise the individual project and its objectives, to clarify the negotiation between the learner and other partners (teachers, tutors, resource providers, peers…), to structure the self-learning process (e.g. work schedule), to facilitate the evaluation and also to help the learner to be attentive to the needs and support of the organisation where he/she is working.

b) A new way to learn ?

What are the basic methodological principles of the DES-TEF? Is the programme compatible with their learners' learning styles and strategies? Does this programme take into account some 'individual variables' such as the technical prerequisites learners' necessary to use the electronic resources efficiently?



How to switch from a learning paradigm where the teacher has the initiative to another one where it is piloted by the learner? How far is it necessary to implement a training session to help the learners to take the initiative, to "learn to learn"? It depends on the context and on the learners' experience!

In our programme, we communicate our **methodological principles** (isomorphism and socio-constructivism – see above) and we provide information on the objectives, methods and tasks linked to the courses.

We promote learners' action and interactions to let them build their knowledge. So, some activities are based on collaborative group work and on case analysis, multimedia animation linked to a project (PARM method – cf Jans et al, 1998). The participants are going to learn these methods by doing. Furthermore, the use of ICT tools (forums, chats, email, etc), of educational multimedia resources and of tools allowing self-assessment (e.g. quizzes) at a distance assists the implementation of such a pedagogy.

In the Piette's study (2001a) on the evaluation of the implementation of the DES-TEF program, one aspect dealt with the pedagogical methods we used. Comments often differed from one student to another: there was no common agreement between the students on the adequacy of one course, activity or methodology. For example, some learners preferred collaborative activities, some preferred individual work; the same was observed between distance or face-to-face courses, a structured presentation of the topic before a personal exploration or not, etc.

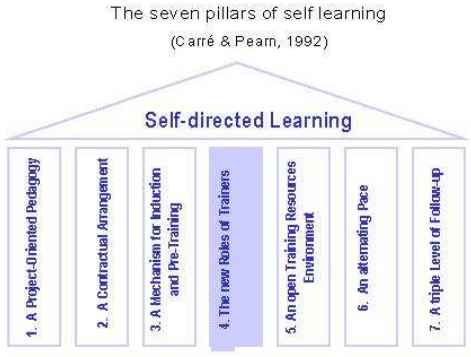
In the inquiry and during the feedback meetings, some students said they preferred deductive methods to inductive ones. These data highlighted differences in the perceptions of the learners and illustrated the need to discuss them to try to adapt as well as we can to individual differences. Since we try to propose different kinds of activities (e.g. PARM

(*Projets d'Animation Réciprqiues Multimédia*), LQRT (*Lecture-Questions-Réponses-Test*), …), that should help not only to provide an overview of the **diversity of the possible teaching and learning paradigms** but also this variety should offer a **large range of learning strategies**.

In a blended programme, it is important to know if learners master the **technical skills** to use the electronic resources efficiently. Another aspect of the Piette's study concerned the evolution of the technical use of the distance learning platform. She observed that, at the beginning of the year (before starting the DES-TEF), most of the learners declared that they were familiar with software required for word processing, Internet use etc so we expected them to master the basic skills to surf on the web and to produce the documents expected by some activities. After their first encounter with the platform, some learners were feeling uncomfortable. So, we set up a hot line (phone) and a thematic forum about technical problems. After a few days, the learners who had difficulties in handling the platform felt reassured. The participants said that they were interested in the explanations given by the instructor and in the discovery of the tool, but some of them felt that they would have need an additional session or written guides. To adapt the system to learners' needs, the activities were re-organised in the following year and additional support was provided to help the learners to autonomously answer some technical questions. The recent adaptation of the curriculum has led us now to propose **pre-training** (upgrading course) addressing the learners' whose technical competencies are not sufficient to use the usual tools of a distance learning platform and to surf on multimedia resources. They decide to follow this course or not on the basis of their answers to a self-assessment questionnaire (see http://www.ulg.ac.be/ste /destef/competences.html).

c) The actors of the blended programme and their roles

Are the trainers' roles different from a traditional or SDL programme? Does it require specific training? Who are the actors of a blended learning programme and what are their roles?



If the learners can be considered as self-learners, this doesn't mean they are alone or isolated.

Of course, the trainers' roles are different than in a traditional face-to-face programme based on the transmission-reception paradigm, but they are very similar to the trainers' roles in a self-learning programme (Denis, 1997). They become **learning facilitators, tutors or resource persons**. For instance, they help the learners to clarify their needs, their project and their plans.

Focusing on the learner's initiative implies adapting the pedagogical methods and often as training the trainers to behave differently. In a self-learning programme, the role of the trainer is crucial and very different from in a traditional one. Carré & Pearn (1992) recommend training the trainers that are going to manage such activities so that they become facilitators of learning. The supervision activities of the trainer increase and the "showman" is replaced by a "resource-person".

New actors are also emerging in blended programmes (like online tutors) and their roles have to be clarified. For instance Goodyear, Salmon and Steeples (2001) propose eight tutor's roles: process facilitator, adviser/counsellor, assessor, researcher, content facilitator, technologist, designer, manager/administrator

In the DES-TEF, the training team is composed of several kinds of actors (teachers, tutors, experts, …) that each have a particular role to play. During the feedback sessions, learners

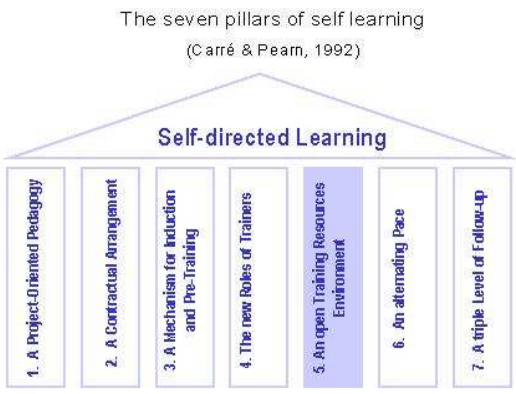
told us that they wanted to have more information on the role of the various actors and to know **which kind of support they can expect from those people** (e.g. what is the difference between a professor, the resource person and a tutor).

Their comments show the need and importance of tutoring. The tutors' roles and limits are a crucial point of negotiation between teacher and tutor, and between tutor and learners. These roles (e.g. supporting the learner on methodological, communicational, content aspects,being co-evaluator, etc.) are influenced by the characteristics of the programme (Lebel, 1995; Charlier et al., 1999; Daele & Docq, 2002). Another condition of success of online tutoring is to provide specific tutors' training. In our programme, a training session based on a tutor's training methodology (Denis, 2003) has been organised to clarify which roles were expected from the tutors.

A specific kind of tutoring is done by the resource person, an experienced member of the learning community – a former student or a teacher, whose role is to help the learner to reflect on his/her learning, to choose the modules appropriate to the project, to clarify the personal project. A specific tool, the logbook, supports these interactions, the learners' metacognition process and the decisions they take (see point f). The learners declared their resource person is very useful, but that sometimes they don't know how far they can expect their help in their project. In fact, a teacher (expert) is devoted to guide them and his/her role increases throughout the year while the resource person's role remains focused on supporting the learner's motivation and reflection on the learning process.

d) The educational resources and ICT tools

What is the actual use and added value of the electronic resources? What strategy is used to help the learners understand the content and the instructions of a task?



The explosion of the learning needs is parallel with the explosion of the resources, especially in the domain of multimedia and distance education (Denis & Detroz, 1999). But sophisticated educational support is not sufficient in itself to enhance self-directed learning. It can open the learning to different kinds of support that serve educational objectives and personal projects. For instance, designing multimedia resources or using a distance learning platform is not a guarantee of effectiveness. The added value of such support must be considered.

In order to define and support the learners' tasks**,** the **objectives** and the **activities** linked to each courses have to be **as clear as possible**. That is why for each course the teachers write down the objectives, how the course is going to run, what the evaluation criteria will be, etc. Especially for distance activities, the instructions have to be precise and meaningful. In addition to the communication tools available through the platform (e.g. forum, chat), the teacher can propose multimedia courses, complementary information (e.g. papers, hyperlinks to websites, etc) and support materials (e.g. powerpoint presentations), a glossary, a thematic bibliography, etc.

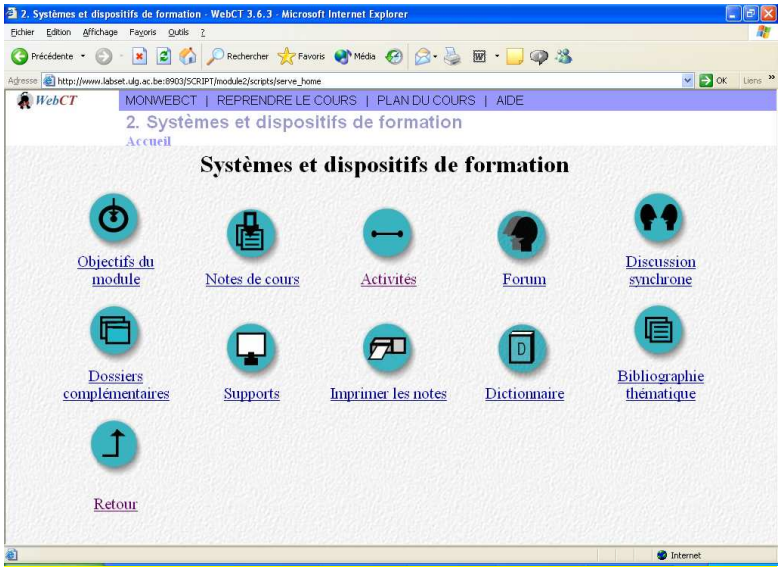
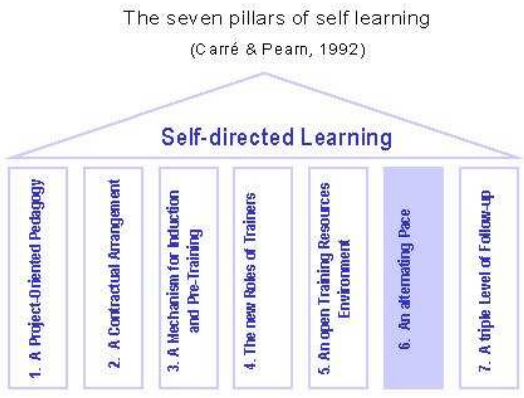


Figure 2 : Example of resources proposed in the course "Training systems" of the DES-TEF.

Such **resources** have a high cost of development and are time consuming. Piette's study (2001a) and the learners' comments during the feedback meetings show their **actual use** and **added value**. All the participants use the online resources. They generally print them so their exploration is linear. They use the hyperlinks to go deeper, especially when they need more information to realise their project. The communication tools such as the forums and the electronic mail helped them to know each other better, to communicate about the different tasks (react to a particular case) and to share their respective points of view on the use of theoretical models, to become more familiar with the use of the tools and to think how to avoid the difficulties due to the lack of analogic communication (e.g. after having interacted in a forum and with the e-mail, they built their own chart of use of these communication tools), etc.

e) The learning pace in a blended learning

How are the activities organised?



Carré & Pearn (1992) insist on a binary rhythm, alternating on the one hand activities at a distance with face to face sessions and, on the other hand, individual with collective work in order to permit to reflect on the action. The DES-TEF offers both face-to-face and distance learning activities. Some courses offer 50% at a **distance**, 50% **face-to-face**. Only one course is full organised at a distance. Some others are also completely face-to-face. But, for all these courses, there are periods of **individual work** so that the participants can work at their own pace and at the moment they choose.

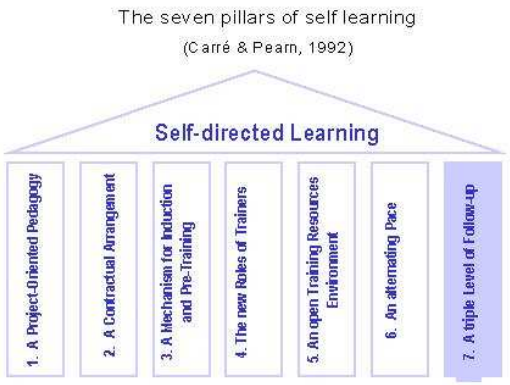
The learners' comments confirm that **collective and collaborative activities** offer them the opportunity to learn from each other when confronting their points of views and having socio-cognitive conflicts (Doise, 1981; Lewis, 1996), to break isolation and enhance motivation, to "socialise the knowledge", and to create eventually communities of practice – former participants decided to create a network and started to use a newsgroup.

However, what do we know about **cognitive or organisational load and understanding of concepts**? Piette's survey (2001a) pointed out some of the weakest links in our programme.

Some problems related to the timing and credits allocated to the activities had to be adjusted in the diary. Some clarification was also asked for different activities, especially about when the learner should consider his/her task is well done and finished. These observations were confirmed by different comments in the learners' logbooks and portfolios or during the regulation sessions. So, to help the students, we implemented instructions and the evaluation criteria.

f) Follow up

How is the learners' follow up organised? Which tools are used to follow up the learners and regulate the programme? Are they useful?



To sustain self-learning in companies, Carré & Pearn (1992) recommend a follow up at three levels: individual, group and institutional. In our blended programme, we focus mainly on the individual follow up. Each learner has a resource person who is a personal counsellor (cf § c). Their interactions are based on a **logbook** where each learner keeps notes of his/her own learning steps (personal experience of learning at cognitive and socio-affective levels, positive and negative experiences).

So, on the one hand, it shows the evolution of learning from the starting point to the final achievement and the possibilities of transferring this apprenticeship and, on the other hand, it provides information to adapt the programme (e.g. cognitive load of the activities, difficulties in understanding different concepts, etc.).

The use of logbooks can be rich but necessitates clarification of the goals and instructions on filling it in. After the first year, we adapted our logbook to address the learners' remarks (Piette et al., 2001). For instance, the questions were more precise and dealt more obviously with the individual, relational and environmental variables as described by Charlier (1998). Other questions still remain: is it to be compulsory or not ? If so, it should be credited as an activity (with an appropriate time allocation). Would it be part of a global grade? Then the evaluation criteria should be different than in the other activities. Piette's experience (2001b) in another context considered these questions and demonstrated the value of the logbooks in regulating the training system, but she also highlighted the enormous amount of time spent by the instructors to manage them. She says that this problem could partially be solved by the organisation of logbook debriefings in groups of students. This solution combines the advantages of allowing discussions between learners about their different perceptions and saving the time of instructors.

Another tool, the **portfolio**, gathers and illustrates the learner's output linked to the activities of the different courses. This folder is also used as a storage item for all documents they consider relevant for completion of their project (tools, references, etc.). It is a tool for self-evaluation since it allows a self-analysis: by looking back on their own outputs, the learners can then measure the evolution of their project and of their competencies

Two kinds of follow up address the group. Generally, there is a **collective debriefing** at the end of each distance learning activity where the participants present and discuss their results. Furthermore, we organise **feedback sessions** between instructors and learners to exchange feelings and experiences in order to adapt the programme.

D. Conclusion

The description of our blended programme through the model of the seven pillars of self-learning (Carré & Pearn, 1992) shows us that this model focusing on the learner activity (project, learning pace) corresponds to our constructivist approach of learning. Moreover, it is useful to ask questions and reflect on concrete aspects (e.g. the contractual arrangement, pre-training requirement, methodology, organisation, actors' roles, resources, follow up and feedback). This could help to enhance the programme design and its efficiency.

In exploring the case of the DES-TEF, we have suggested different principles and tools that, in this context, have permitted us to better adapt this programme to the learners' needs and to the instructors' tasks. Using some questions tackled in the model of the seven pillars of self-learning, we have illustrated the specificities of an adult training programme, the importance of offering a flexible curriculum that matches the learners' needs. We have insisted on the definition of a personal project that produces meaningfulness to the learning. We have discussed the need to have trainers aware of the type of programme in which they are working and agreeing to apply a methodology centred on isomorphism and both individual and collaborative work. We have also dealt with the necessity to provide some pre-training to learners entering into our blended programme. We have insisted on a clarification of the actors' roles and on communication to the learners about what they can expect from them in terms of learning support. We have considered the potential added value and the way the multimedia resources and the ICT tools are used and we found this always has to take into account the individual learner's context. The blended organisation was adapted with the help of several strategies (e.g. feedback meetings, face-to-face group debriefings) and instruments (e.g. logbook).

Other frameworks such as the model of the "Diamond" (Leclercq et al. 2000) that provides useful categories or check list of questions could also have been used to describe our instructional design, but the Carré & Pearn's model devoted primarily to self-learning seems relevant in the preparation or analysis of distance and blended programmes since it is directly focused on the learner.

E. References

Bruner, J. (1996). *The Culture of Education*, Cambridge: Harvard University Press.

Carré, P. (1990). The self-learning gamble: an examination of the issues involved. In Nyhan, B. (1990). *Developing people's ability to learn. A European perspective on self-learning competency and technological change*. Brussels, Eurotecnet., pp. 74-81.

Carré, P. & Pearn, M. (1992). *L'autoformation dans l'entreprise*. Paris. Entente.

Charlier, B. (1998). *Apprendre et changer d'enseignement : expériences d'enseignants*. Bruxelles. De Boeck.

Charlier, B., Daele, A., Docq, F., Lebrun, M., Lusalusa, S., Peeters, R. & Deschryver, N. (1999). « Tuteurs en ligne » : quels rôles, quelle formation ?. In : CNED (Ed.), *Actes des deuxièmes Entretiens Internationaux sur l'Enseignement à Distance*. 1er et 2 décembre 1999.

Charlier, B. & Peraya, D. (Éds). (2003). *Apprendre les technologies pour l'éducation : analyses de cas, théories de référence, guides pour l'action.* Bruxelles, De Boeck.

Daele, A. et Charlier, B. (Éds). (2002). *Les communautés délocalisées d'enseignants*. Étude du Programme de Numérisation pour l'Enseignement et la Recherche (PNER), Paris, mars 2002.

Daele, A. et Docq, F. (2002). « Le tuteur en ligne, quelles conditions d'efficacité dans un dispositif d'apprentissage collaboratif à distance ? » *Communication au 19ème colloque de l'AIPU, (Association Internationale de Pédagogie Universitaire), Les méthodes actives dans l'enseignement supérieur. Regards pluriels et critiques sur les pratiques*, 29 au 31 mai 2002, Louvain-la-Neuve.

Denis, B. (2001). Collaborative learning in a virtual campus. Allowing future teachers live what their future learners could live about technologies and education, *Bridging instruction to learning, 9th European Conference EARLI*, University of Fribourg, 28th August- 1rst September 2001.

Denis, B. (2003). Quels rôles et quelle formation pour les tuteurs intervenant dans des dispositifs de formation à distance ?. *Distances et savoirs*, 1- n°1/2003 **.**

Denis, B. & Leclercq, D. (1994). The fundamental IDs and their associated problems. in J. Lowyck and J. Elen, Modelling I.D. Research, *Proceedings of the first workshop of the special interest group on instructional design* of EARLI, Leuven, June 17-19, 1994, pp.67-83.

Denis, B. et Detroz, P. (1999). L'enseignement à distance : quelques exemples européens. Instruzione A Distanza, La valutazione nella formazione a distanza, Il progetto tee ode, *Serie monografica*, 5, Anno XI, 15, Dicembre 1999, 10-45

Denis, B. & Piette, S.-A. (2003). Regulation of training system for adults in educational technology. *IFIP, working group Quality education @ a distance*. Geelong. 2-6 February 2003.

DES-TEF (2003). Diplôme d'Études Spécialisées en Technologie de l'Éducation et de la Formation, Universités de Liège et de Namur. http://www.ulg.ac.be/ste/destef/

Doise, W. & Mugny, G. (1981). *Le développement social de l'intelligence*. Paris : Inter Editions.

Freinet C. (1977). *Les Techniques Freinet de l'école moderne.* Série carnet de pédagogie pratique, Éditions Armand Colin.

Goodyear, P., Salmon, G., & Steeples, C. (2001). Competencies for online teaching. *Education Training & Development*, 49(1), 65-72.

Jans, V., Leclercq, D., Denis, B & Poumay, M. (1998). PARM : a project method based on reciprocal animations and multimedia, in Instructional design for problem-based learning. Proceedings of the third Workshop of the EARLI SIG Instructional design. University of Maastricht, June 26-27, 1998, 171-180.

Kremers C. & Piette, S.-A. (1999). Etre co-pilote de sa propre formation en entreprise, colloque EARLI, Göteborg, sept.99. http://www.crifa.fapse.ulg.ac.be/flexifor/pgenjeux.htm

Knowles, M. (1975). Self-directed learning. Association Press.Knowles, M.

Learn-Nett (2002) *Learn-Nett : un campus d'apprentissage collaboratif à distance.* http://tecfa.unige.ch/proj/learnett/

Lebel, C. (1995). « Le tuteur et l'autonomie de l'étudiant à distance », *Journal of Distance Éducation/Revue de l'éducation à distance*, X(1), 5-24.

Leclercq, D. et al. (2000). *Dispositifs d'Apprentissage et Modèles Appliqués aux Nouvelles Technologies (DIAMANT)*. Service de Technologie de l'Education, Université de Liège, document interne.

Lewis, R. (1996). *Working and Learning in Distributed Communities*. Universidad Autonoma de Madrid, seminar, Computer Supported Learning Environments.

Nyhan, B. (1990). *Developing people's ability to learn. A European perspective on self-learning competency and technological change*. Brussels, Eurotecnet.

Perret Clermont, A.N. (1979). *La construction de l'intelligence dans l'interaction sociale*. Berne : Lang.

Peeters, R., Charlier, B., Daele, A., Cheffert, J.-L., Lusalusa, S. & Vida, T. (1998). *Learning collaboratively in a virtual campus - Apprendre en collaborant dans un campus virtuel*. Projet Learn-Nett : rapport du groupe de travail n°4.

Piette, S.-A. (2001a) *Enquête sur la mise en œuvre du dispositif du DES-TEF en vue de le réguler. Liège.* Document interne. Service de Technologie de l'Université de Liège.

Piette, S.-A. (2001b) *Le carnet de bord comme outil de formalisation personnelle de ses acquis*. Mémoire de Diplôme d'Études Spécialisées en Technologie de l'Éducation et de la Formation (DES-TEF), Université de Liège.

Piette, S.-A., Denis, B. et Charlier, B. (2001). *Le carnet de bord des étudiants du DES-TEF, DES en Technologie de l'éducation et de la formation*. *Module « Enseignement et apprentissage ».* Document interne. Université de Liège et Facultés Notre-Dame de la Paix de Namur.