

# Practical experiences of reusing LAMS pedagogical templates

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The paper presents two experiences of use of LAMS in different domains and delivery modes. The first one concerns the development of training courses in the field of waste management. The second deals with the creation of a Bachelor course in the ICT domain. One of the goals of this study is to investigate the re-usability of pedagogical templates. According to our experience, pedagogical templates can represent a model that can be applied to a different domain, but the process is not direct and immediate. A general suggestion for template developers is to try to be as generic as possible in pedagogical template definition in order to minimize adaptations and changes for further uses. The need for separating content from pedagogical activity structures emerges to be a determinant factor. Another issue that was analysed is the conversion of a traditional into a blended learning course. In this process the main difficulty is the effort required to conceptualize the teaching process in terms of sequences of learning activities. The LAMS authoring environment has demonstrated to be a valuable tool to support this process. In addition, the conversion process is useful to improve and enrich the course with new, not originally included, didactic resources and activities.

Keywords: learning design, pedagogical template re-usability, LAMS activity sequence, traditional and blended learning

## Introduction

In this paper two different experiences of using LAMS for training are described. The first one concerns the development of training courses in the field of waste management. The second one deals with the creation of a Bachelor course in the ICT domain. Even if the two experiments are both based on the LAMS tool, the approach followed to create the courses is different.

The first experience is in the context of the European Leonardo da Vinci WASTE TRAIN project ([www.waste-train.com/](http://www.waste-train.com/)), whose goal is the development of multilingual training courses in the field of waste management. This training is designed for heterogeneous target groups, mainly decision makers at strategic levels, and executives & staff having to deal with solid wastes in their every-day life, who are working in municipalities and public/governmental organizations. A flexible environment to organize the didactic resources and appropriate tools to define learning activities for different target users were required. The choice was to use the Moodle (Modular Object-Oriented Dynamic Learning Environment) platform integrating the LAMS (Learning Activity Management System) learning tool, as already evidenced to be effective in academic contexts (Gámez 2007). Moodle was chosen because it is a free open-source course management system (CMS) designed to help educators and teachers to create and manage on-line courses, and promote effective on-line learning communities with wide interaction possibilities (e.g. forum, blog, wiki, chat) among students and tutors. LAMS, also chosen because it is a free open-source tool, was integrated with the objective to design, manage and deliver appropriate

learning activities for different student groups.

The second experience deals with the transformation of a traditional academic course, which is typically “face-to-face” delivered, into a blended learning course using LAMS. The blended learning approach combines face-to-face instruction with computer mediated instruction (Bonk & Graham 2006). The target users are students enrolled in the SUPSI Computer Science Bachelor programme ([www.dti.supsi.ch](http://www.dti.supsi.ch)). The original course is based on Moodle to organize and provide students with the didactic resources. LAMS is used later to organize the learning activities and allow the course to be delivered in blended learning mode. Therefore, also in this case, the technical solution to integrate LAMS in the Moodle platform is exploited.

In both experiences, this choice satisfies the need to provide meaningful learning engaging the learners in meaningful tasks. As suggested in (Jonassen et al 2008), “in order for meaningful learning to occur, the task that students pursue should engage active, constructive, intentional, authentic, and cooperative activities”, which are well supported in Moodle and LAMS. Their social constructivist educational models are more effective than traditional educational models (Pagan 2006).

In the WASTE TRAIN project different pedagogical templates have been defined in order to cope with the different target users. One of the goals of this study is to investigate the re-usability of these pedagogical templates in another domain (in this case in the ICT domain), which is, according to Dalziel (2003), one of the strong points of the LAMS tool. As Dalziel (2003) states, “one of the powerful features of the learning activity approach is that the content of a sequence can be easily changed to suit a different discipline, while leaving the activity structure unchanged ... The point is that the learning activity sequence can provide a pedagogical template which may be useful in many contexts by changing the “content” to suit different discipline areas.”

The learning design reuse issue has been widely considered in the literature. A common finding indicates a general positive inclination towards reusing of other teachers’ designs, although it is also recognized that there is a gap between this intention and their actual practice (Walker & Masteman 2007). Similar conclusions have been drawn by Lucas (et al. 2006) in the field of English Studies: they recognize that, despite some barriers, “a nascent culture of sharing” exists amongst English academics and acknowledge the considerable potential of “LAMS sequences that were designed with sharing in mind” for capturing and modeling pedagogical practice. In this study re-usability is referred to both learning design and material, while the focus of our investigation is specifically on reusing learning design. Hernández-Leo et al. (2006) face the problem of reusing learning design from a wider perspective, and classify the most relevant proposals for creating Units of Learning by reusing pre-existing solutions at different levels of granularity and completeness.

In this paper generic training environments for traditional and blended learning will be firstly outlined, comparing the involved actors and their role within the two environments. Afterwards, the two experiences of using LAMS for training are described. Finally the conclusions drawn from them are presented.

## **The training environment in traditional and blended learning**

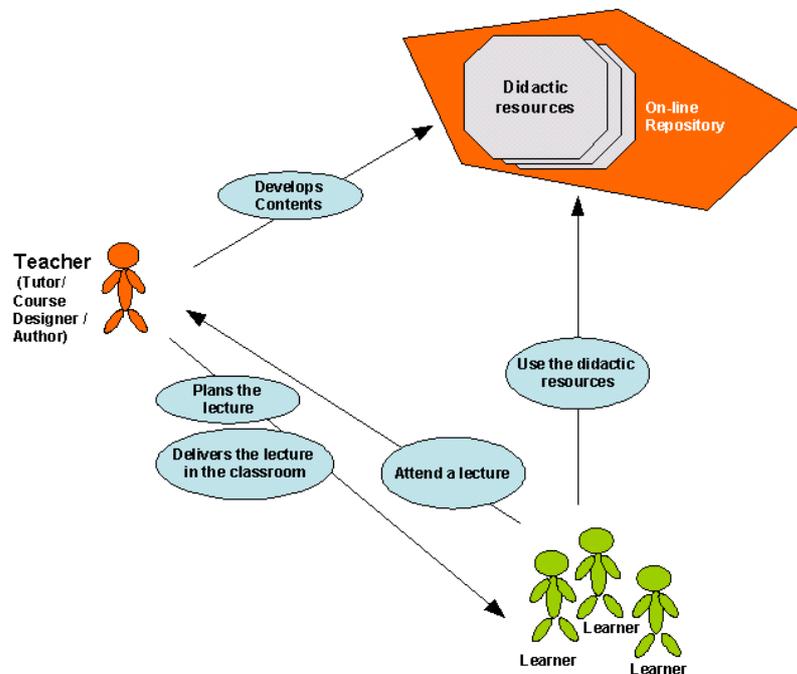
In order to understand the process and implications of converting a traditional into a blended learning course, this section illustrates the training environment in the traditional and blended approach.

Figure 1 presents the actors involved in traditional learning and outlines their role. It is possible to identify two actors:

- the *teacher*, who usually plays different roles: i) course designer who plans the face-to-face activity sequence, ii) tutor who delivers the lecture in the classroom, and sometimes also iii) author of the didactic resources who writes and organizes the didactic material;
- the *learner*, who attends the lecture and accesses the didactic resources usually stored in an on-line repository.

Strictly speaking, the traditional way of delivering courses does not require an on-line repository of didactic resources. However, since it is now a common practice in many academic courses to collect

slides and reference material for students in an on-line repository, this part has been added in the schema (Fig.1). The combination of electronically available didactic material and face-to-face sessions could represent a form of blended learning, but, since the face-to-face component is the dominant part, we still consider this form of training as traditional. It is worth noting that these repositories of didactic resources are often based on course management systems, which are used in a limited way without exploiting all the e-learning functionalities.



**Figure 1: The training environment in traditional learning: actors and actions**

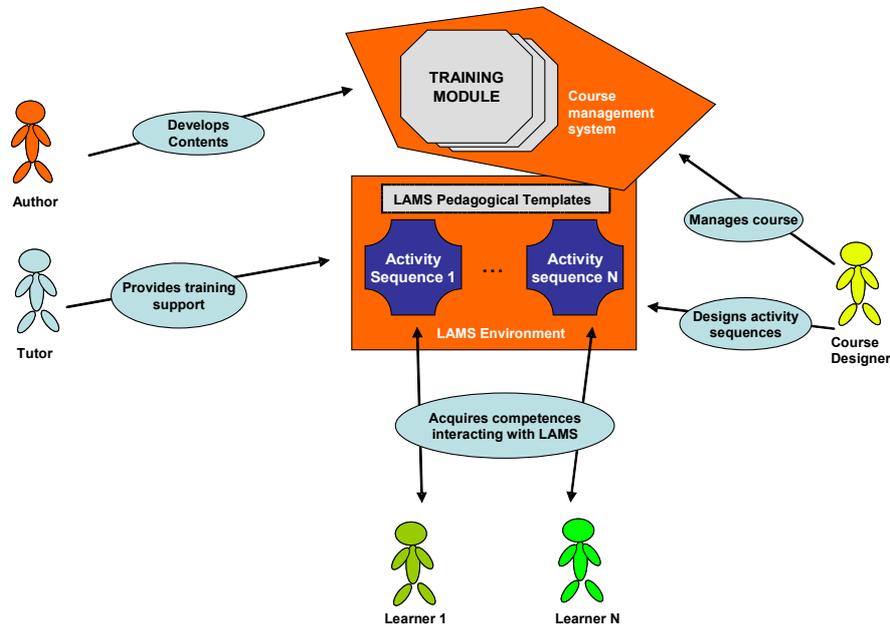
Figure 2 presents the training environment and the different actors involved in a blended learning training experience. The actors include:

- the *author*, i.e. a domain expert who develops content and didactic material;
- the *tutor*, who provides the training support and monitor student activities;
- the *course designer*, i.e. the pedagogical expert who defines and arranges the learning activity sequences;
- the *learner*, who is the target user of the training modules.

Two aspects emerge by comparing the two figures. One aspect which is worth noting is that, while in the traditional approach all learners attend the same lecture with limited possibility of adaptation to the single learner needs, blended learning permits personalized training. Another interesting aspect is that in the blended learning context the number of actors increases. There is a clear separation among the author who is in charge of preparing the didactic material, the tutor, who supports the students during the learning experience, and the course designer, who plans the activity sequences.

Role separation produces both positive and negative effects. On one hand, it guarantees that the different tasks, i.e. content authoring, pedagogical planning, tutoring, etc., are performed by actors who are really experts in that task, and it is the only possible solution in large-scale contexts. On the other hand, the lack of a direct contact between authors, course designers and students may sometimes represent an obstacle towards a course that should be tailored to the learner needs. Tutors, who are closer to the learners, know their students and are generally aware of their needs, but are not allowed to or in charge of changing content and learning activities. Therefore, it is frequent that these actors have to collaborate to refine the initially delivered course in order to adapt it to the student needs. This problem does not emerge in a face-to-face approach where the individual teacher plays the roles of course designer, tutor, and often author

too. It is also worth noting that the ideal teacher should have optimal performance in all of these skills. The role separation issue is also considered by Dalziel (2007a), who states that the distinction between the course designer (author of the activity sequences) and the tutor (monitor) is powerful for sharing, re-using, adapting but makes running a course more complex.



**Figure 2: The training environment in blended learning: actors and actions**

## Use of LAMS in the WASTE TRAIN project

One of the goals of the EU Leonardo WASTE TRAIN project is the development of training courses in the field of Modern Solid Waste Management which is based upon the new main principles of European Environmental Policy and European Waste Management Policy. The consortium involves academic and industrial partners from 9 different countries, speaking 8 different languages.

In the context of this project the role of the actors described in figure 2 is played by different partners according to their competences. For instance, the domain experts (German and Austrian partners) are the main authors of the content. The pedagogical experts (Swiss and Italian partners, i.e. SUPSI and Training 2000) play the role of course designers and provide support for the preparation of didactic resources from content. The training target users (e.g. Turkish and Polish partners) are the organizations which reach and therefore represent the learners.

The authors prepared the training material that was then organized and managed using the Moodle platform. In particular 9 modules were created (see figure 3), and additional parts (e.g. introduction, glossary) were provided to complete the material. Due to the heterogeneous types of target users, the need for personalized training emerged. This personalization was implemented for example by creating different course typologies on the same subject. In particular two main pedagogical templates were defined: basic and advanced, in order to have two different uses and deepening levels of the same material or resources. The course designer is the author of the activity sequences planned to meet the different learner needs, explicitly identified and represented in Learning Objectives tables associated to each module. We explicitly remark that the author of the content, who does not appear in the LAMS environment, is different from the author of the activity sequences, named course designer.

In a large-scale context, such as the WASTE TRAIN project, the role separation is indispensable because it involves different entities and organizations geographically distributed with clear delineated

competences. A single actor could not cover all the tasks. At the same time the role separation generate some issues. One of these was that the course designer had to ask the authors additional material to organize and produce the appropriate pedagogical activities. In other words, the contents initially produced by the authors were not sufficient to create all the planned pedagogical activities. Another issue arose because the tutors were not familiar with the LAMS environment and required the course designer's help to understand how to use the tool. Therefore the different actors had to interact and collaborate to produce and use the training material.

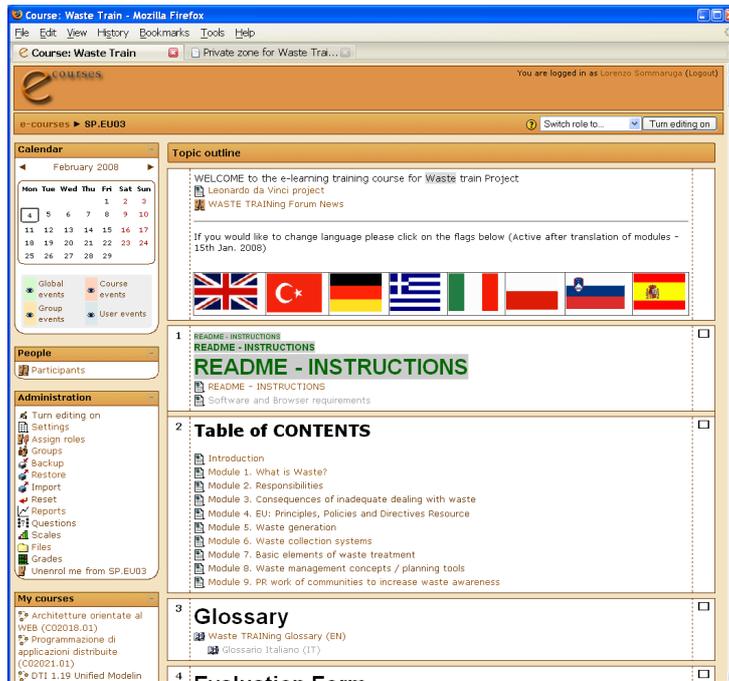


Figure 3: The WASTE TRAIN modules in the Moodle environment

Figure 4 illustrates the LAMS author environment, where the course designer has developed the advanced learner sequence. Different types of activities are indicated in the sequence including “Question and Answer” (Q and A), “Chat”, “Content Activity”, “Assessment”, etc.

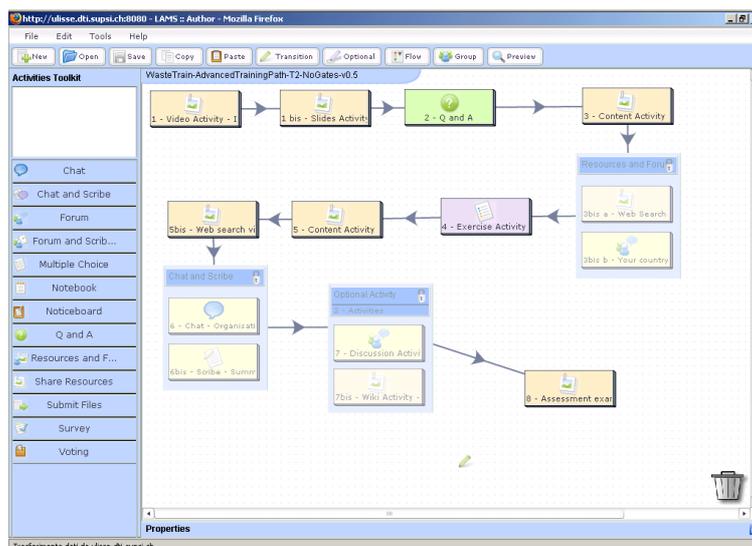
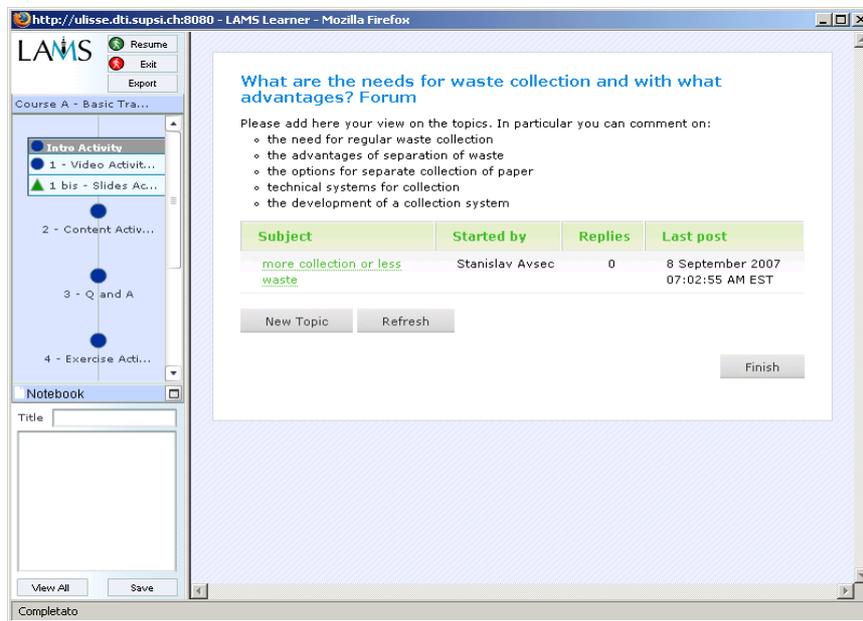


Figure 4: The LAMS authoring environment for the advanced course sequence

Figure 5 shows the LAMS learner environment, organized in two parts: the left part shows student progress through activities, while the main panel shows the current activity, which is in this case a forum.

In addition to attend the course through the planning sequences of the pedagogical templates presented above, students may freely use the didactic material directly using the Moodle environment.



**Figure 5: The LAMS learner environment**

The tutor can monitor the student progresses through the LAMS monitor environment (see figure 6). The picture shows the current progress of students through a particular sequence. In this case it is the basic activity sequence.

Once the contents have been written and the activities defined, the training experience started according to a scheduled testing period of the WASTE TRAIN project. A first course prototype was initially developed in English and tested in Summer 2007. A preliminary evaluation was carried out aiming to identifying some bugs in the system and collecting remarks for improvements. The preliminary study has demonstrated the feasibility of use of LAMS and Moodle. In order to have a systematic feedback from heterogeneous groups of geographically distributed users, a further testing is planned to be carried out in Summer 2008, developing and using an appropriate testing methodology. Localization of the content for different countries is in progress and will be used for the final test.

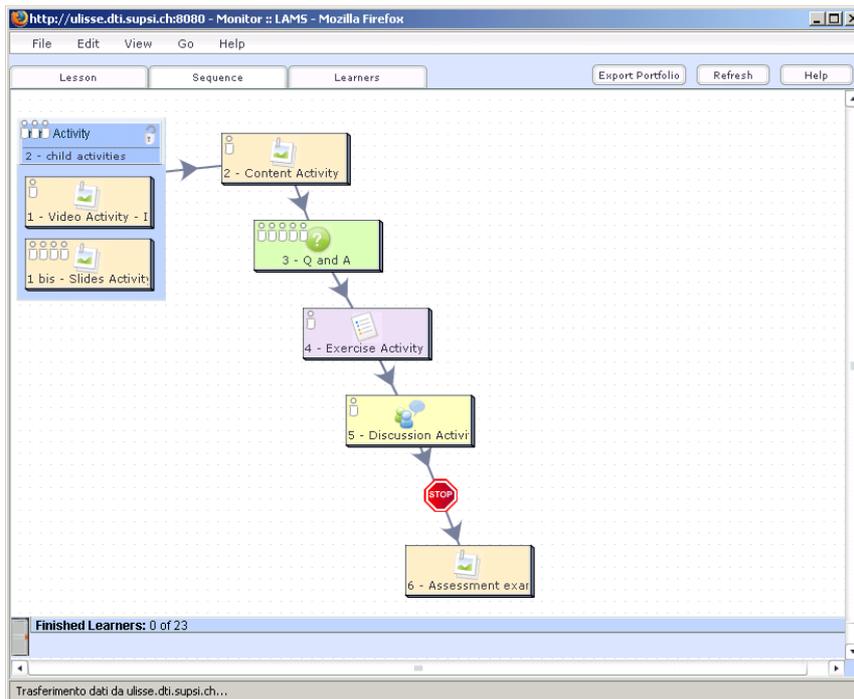


Figure 6: The LAMS monitor environment for a basic course sequence

## Use of LAMS for the “Distributed Application” course

Since 2004-2005 A. A., the “Distributed Application” course has been delivered in the traditional way as illustrated in figure 1. The Moodle support is exploited to organize and provide students with the didactic resources and examination (see figure 7). Recently, a “blended learning” version of the course was created (see figure 2) using LAMS to organize the learning activities. In this way the course could address a wider target such as the SUPSI-DTI Continuous Learning Programme. Hereafter the translation process is described, highlighting the issues this process implies.

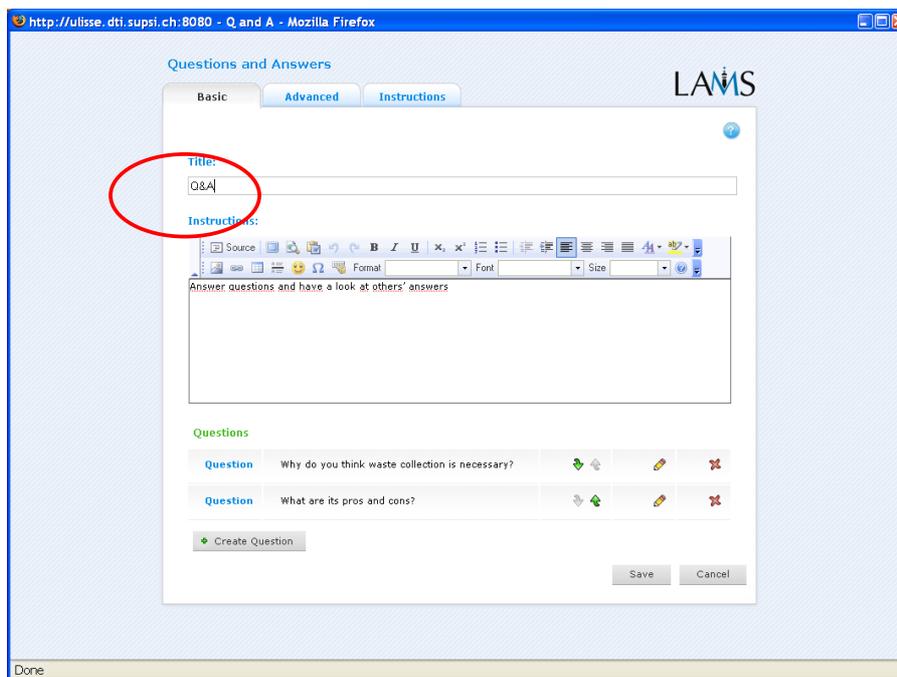
The screenshot shows the Moodle course page for 'Applicazioni distribuite I3.01'. The main content area displays two modules: '1 Sistemi distribuiti ed Architetture SOA' and '2 Web Services, SOAP'. The interface includes a navigation menu on the left with options like 'People', 'Activities', 'Search Forums', 'Administration', and 'My courses'. The right sidebar contains 'Latest News' and 'Upcoming Events' sections. The browser address bar shows 'Course: Applicazioni distribuite (CO2021.01) - Moodle Firefox'.

Figure 7: The “Distributed applications” course modules in the Moodle environment

The target users of the “Distributed Application” course are students of a Computer Science Bachelor curriculum with similar features and background. They can be therefore considered as a homogeneous group of learners. Having defined for the WASTE TRAIN courses some generic pedagogical templates, the experiment consisted of verifying whether and how these templates were re-usable in a new domain and for a new target. The basic activity sequence was chosen to start this study.

A first issue emerged in this process is the need to clean up the templates to make them generic. This requires a more considerable work if the template form contains specific terms. The suggestion for template developers is to try to be as generic as possible. For instance, instead of using a specific title such as “*Q&A: waste train ...*” it is better to write a generic title “*Q&A*” without any reference to the specific course (see figure 8). Analogously, the first question “*Why do you think waste collection is necessary?*” makes specific reference to the waste domain, while the second question “*What are its pros and cons?*” is generic and it will be more easily reusable. This would allow template adaptations to be minimized.

Another general result is that the reuse of templates is not an immediate process because of the size of the modules: the WASTE TRAIN modules have a small granularity compared with those of the “Distributed Application” course. Therefore an activity such as the *content activity* on a large module can imply very long times.



**Figure 8: Re-using pedagogical templates in LAMS**

Another finding that has arisen is that sometimes the reuse of pedagogical templates requires the production of new didactic resources, which were not initially foreseen in the traditional face-to-face course. For instance, an introductory *video* has been added to the course material with the purpose to introduce the main subjects of the course. Although the video was not formalized in the traditional course in terms of a codified learning resource, live demonstrations during the first lecture had the same goal. Therefore, this experiment of conversion has also been useful to improve the traditional face-to-face course with the integration of material not originally designed.

As a general conclusion, the issue of converting a conventional face-to-face course into a blended learning course may present difficulties because it requires the conceptualization of the teaching process, i.e. it implies the need to formally capture in terms of sequences of learning activities what is sometimes

not well defined and informally carried out during the face-to-face lecture. The LAMS authoring environment has demonstrated to be a valuable tool to support this conceptualization process. As Dalziel (2005) states “LAMS becomes a general lesson planning tool, with technology-based delivery of activities as an option”, i.e. an activity can be run in on-line or face-to-face mode. In addition, the definition of pre-defined learning activities can help a student have an organized way of studying and drive her/him to the accomplishment of the learning objectives.

At the moment, the course has been prepared to be delivered in blended learning mode, but it is still delivered to students in the traditional way, according to the original course planning strategy. Therefore, the work is still in progress and additional results will be gained once the course will be delivered in the new form and tested by the students.

## Conclusions

The paper has presented two experiences of use of LAMS in different domains. The following table summarizes the main differences between the two case studies.

	WASTE TRAIN course	DISTRIBUTED APPLICATIONS course
Course typology	vocational	academic
Domain	waste management	ICT - Comp. Science Eng.
Development stage	concluded 1 <sup>st</sup> run	in progress
Delivery mode	blended	face-to-face
Learners' features	heterogeneous	homogeneous

**Table 1: Differences between the two case studies**

An issue that was particularly considered was the re-usability of pedagogical templates. According to our experience, pedagogical templates can represent a model that can be applied to a different domain, but the process is not direct and immediate. A general suggestion for template developers is to try to be as generic as possible in pedagogical template definition in order to minimize adaptations and changes. Domain specific content should be avoided in the definition of LAMS sequences and should be delegated only within each learning resource.

One of the encountered difficulties in template adaptation is probably due to the fact that, in our experiment, not only the domain but also the course typology was different: one is a vocational course which mainly involves adults and professionals, the other is an academic one, which involves younger students. Another difficulty is the lack of didactic material to be used in a specific pedagogical activity foreseen in the LAMS template, that requires the author to produce new didactic resources. We do not exclude that adaptation difficulties can also be due to the fact that the pedagogical template itself requires improvements. As in the field of software development, where good design patterns have been developed across years of experience, in pedagogical template design additional experience is necessary to identify the best design pedagogical patterns and to be able to draw out generalized learning design principles. In the future we plan to further investigate the issue of template re-usability, testing whether the basic and advanced learner templates can be used for courses of the same typology, and analysing more deeply existing repositories of LAMS sequences (Dalziel, 2006) to verify how easily pre-defined templates may be adapted. A preliminary analysis of this repository seems to highlight that, although it contains a rich collection of templates in different fields, it is not easy to find an appropriate template for specific education and training purposes. This is due to the fact that there is no separation between the contents and the pedagogical activity structures, i.e. LAMS pedagogical templates are not generic models but are sequences “instantiated” with a specific content. Pedagogical planners seem to be a possible solution to this problem (Dalziel 2006, 2007b).

The need for separating content from pedagogical activity structures has also been discussed in the Models of Practice and Pedagogic Planners Meeting, (<http://dfi.cetis.ac.uk/wiki/index.php/Sharingmeeting>, October 2006), which highlights the importance of defining reusable patterns as abstractions that can be instantiated with specific contents. An approach towards the separation between the content and the structure of pedagogical activities was already proposed in (Sommaruga & Catenazzi 2004), where different reusable activity models, including answering test questions, problem solving, etc. were formalized using the XML technology. Each activity was associated to a specific learning objective. This type of formalization could be extended to describe sequences of activities in the form of LAMS pedagogical templates. The issue of defining learning activities is also considered in the SCORM standard (<http://www.adlnet.gov/scorm/>). In particular, the Sequencing and Navigation book describes branching and flow of activities in terms of an *activity tree*, based on the results of a learner's interactions with content objects and an authored sequencing strategy.

Other findings concern the issue of converting a conventional academic course into a blended learning course. In this case the main difficulty is the effort required to conceptualize the teaching process in terms of sequences of learning activities. The LAMS authoring environment has demonstrated to be a valuable tool to support and speed-up this process. As a collateral result it is possible to state that the process of conversion of a traditional into a blended learning course has been useful to improve and enrich the course with new, not originally included, didactic resources and activities, impacting on the overall quality of the course.

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## Biographical notes

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He graduates in Computer Science at the University of Milano (Italy, 1989) and receives a PhD in Psychology from Nottingham University (UK, 1993). After four years at University Carlos III of Madrid (Spain) and then in an Italian Government funded research project on e-learning, he is currently heading the Semantics and Multimedia Systems (LSMS) Laboratory at SUPSI-DTI, and co-director of the joint SUPSI-USI (University of Southern Switzerland) elearning laboratory (eLab). He is teaching and disseminating XML technology since 1998 and is actively applying it to different domains from elearning to content management and intelligent web. Interests and research areas: XML technology, new web standards, e-learning systems and standards, knowledge representation, AI and agents, and new information and communication technologies. He is author of various international publications in some of these areas.

### Nadia Catenazzi

She graduates in Computer Science at the University of Milano in 1989, and receives a PhD in Information Science from the University of Strathclyde, Glasgow in 1994. She works four years as lecturer and researcher at the University Carlos III of Madrid (Spain). In 1998 she goes on with the research activity at Mediatech working on an e-learning project. Since 2002 she is a lecturer in the Department of Computer Science and Communication Science at the University of Insubria of Varese (Italy) and she is collaborating with the Innovation Technologies Department at the University of Applied Sciences of Southern Switzerland (SUPSI). Her main research areas include electronic publishing, multimedia, e-learning, semantic web, and, in general, new Internet technologies. She is the author of various international publications in these areas.

### Kylene De Angelis

She is an expert in vocational education and training (VET), is CTO of Training 2000, VET organization in Italy. Cooperates in European research and development projects on new training methodologies and on-line didactics, innovative technology for training and integration of socially disadvantaged groups.

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