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eLearning in the Swiss Universities of Applied Sciences

Nr. 4

Kurzfassung

Dieser Bericht zeigt die Resultate einer Studie zum Thema eLearning in den Schweizer Fachhochschulen (FHS). Die Studie wurde vom Bundesamt für Berufsbildung und Technologie (BBT) in Auftrag gegeben und vom NewMedia in Education Laboratory (NewMinE Lab) der Università della Svizzera Italiana (USI) durchgeführt. Ziel war es, den Entwicklungsstand des eLearning an den FHS einzuschätzen und zu bewerten. Dazu wurden Schulen in Finnland, Deutschland und den Niederlanden besucht, um die Situation ausgewählter Europäischer Bildungsinstitute mit entsprechenden Schweizer Beispielen zu vergleichen und den Best Practice zu ermitteln. Der abschliessend empfohlene Massnahmenkatalog soll dazu beitragen, das eLearning in den FHS auf eine nachhaltige Basis zu stellen.

Unsere Analyse zeigt, dass in allen FHS Kompetenzen und aktive Gruppen im Bereich eLearning vorhanden sind, auch wenn das Aktivitätsniveau und die Ressourcen von Schule zu Schule variieren. Die Programme des Bundes, Virtueller Campus Schweiz (VCS) und Creatools, spielten eine Schlüsselrolle bei der Förderung dieser Entwicklung. Dennoch ist die Situationen in zahlreichen Fällen noch nicht stabil: die meisten Gruppen sind klein und verstreut und die Unterstützung der Schulleitung ist im Allgemeinen schwach. Auch muss in den meisten FHS erst noch eine Lösung für ein Supportzentrum auf Stufe Gesamtschule gefunden werden. Damit besteht das Risiko, dass nach Ablauf der Bundesprogramme nur eine Minderheit der FHS in der Lage sein wird, eLearning in grossem Umfang einzuführen. Verantwortlich für diese Situation sind vor allem strukturelle Merkmale der FHS: FHS sind kleiner als Universitäten und geografisch verstreut. Schulleitung und zentrale Abteilungen sind eher schwach und diese Schulen sind mit dem Restrukturierungsprozess so beschäftigt, dass eLearning nicht als Priorität betrachtet wird. Folglich meinen wir, dass in diesem Bereich ein Überdenken der Strategie nötig ist, damit die FHS die Chancen des eLearning für ihre Entwicklung nutzen können. Wir schlagen einen vierteiligen Massnahmenkatalog vor:

1) eLearning muss als Chance gesehen werden, um die Entwicklung von FHS voranzutreiben und um Problemkreise wie beispielsweise das Erreichen einer kritischen Masse bei den Bildungsangeboten oder die Entwicklung von Masterkursen zu bewältigen. Mit diesem Ziel vor Augen sollte jede FHS innerhalb der nächsten Jahre einen strategischen Plan entwickeln, der folgende Fragen beantwortet: Welchen Zielen soll eLearning dienen und wie wird es eingebunden in die Gesamtentwicklung der Schule? Welches sind die wichtigsten Einführungsszenarien? Für welche Bildungsangebote? In welchen Formen? Wie soll der Einführungssupport gestaltet sein? Welche Infrastrukturen und Ressourcen werden benötigt und wie sollen sie bereitgestellt werden?

2) eLearning muss als Set von Hilfsmitteln gesehen werden, das dazu dient, die Lehrpläne zu überarbeiten, um deren Qualität zu verbessern, neue Möglichkeiten des Lernens zu finden und neue Zielgruppen zu erreichen. Das bedeutet, dass eLearning in die Didaktik und Bildungsplanung integriert sein muss. Die Einführung des Bologna-Modells stellt in diesem Sinn eine historische Chance dar, zumal dadurch zahlreiche Lehrpläne sowieso umgestaltet werden müssen. Einige Szenarien beinhalten die Einführung von eLearning zur Unterstützung bestehender Lehrgänge (online Kursmaterialien, Kontakt mit Lehrpersonal), die Gestaltung von Bildungsangeboten mit reduzierten Präsenzzeiten, um den Bedürfnissen arbeitender Studierender entgegen zu kommen, gemeinsame Bildungsangebote von verschiedenen Institutionen (zum Beispiel auf Stufe Master).

3) Die Unterstützungsstragien müssen überarbeitet werden, zumal das Modell eines eigenen Support-Zentrums für jede Schule der Gesamtorganisation der Fachhochschulen nicht dienlich ist. Stattdessen sollten regionale Lösungen angestrebt und zwischen den einzelnen Zentren Ergänzungsleistungen vereinbart werden.

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4) Basierend auf dem Argument der Grösse der FHS ist die Zusammenarbeit zwischen den einzel-nen Schulen gezielt weiterzuentwickeln. Gemeinsame Abkommen sollten sich nicht auf die Projektstufe beschränken, sondern müssen ausgeweitet werden auf gemeinsame Angebote von Ausbildungsprogrammen, Dienstleistungen und Infrastrukturen. Die Erfahrungen anderer Länder zeigen, dass Kooperation ein Schlüsselelement darstellt bei der Entwicklung von eLearning, spe-ziell in kleinen Schulen und in begrenzten Märkten. Des Weiteren braucht es eine stärkere natio-nale Koordination, beispielsweise bei den Support-Zentren, im Immaterialgüterrecht und im Bereich der Technologie. Daher schlagen wir vor, dass die eLearning-Gruppe der Schweizerischen Fachhochschulkonferenz (KFH) verstärkt wird im Hinblick auf eine bessere Koordination mit dem Programm Virtueller Campus Schweiz.

Abstract

Ce document présente les résultats d'une étude mandatée par l'Office fédéral de la formation pro-fessionnelle et de la technologie OFFT et réalisée par le NewMedia in Education Laboratory de l'Università della Svizzera italiana sur l'eLearning dans les hautes écoles spécialisées suisses HES. Le premier objectif de l'étude était de dresser un état des lieux du développement de l'eLearning dans les HES. Dans un deuxième temps, grâce à des visites de HES en Finlande, en Allemagne et aux Pays-Bas, l'étude compare un échantillon d'écoles européennes avec leurs contreparties suisses et esquis-se un set de best practices. Finalement, les auteurs proposent une série de mesures pour que l'eLearning au sein des HES puisse acquérir des assises plus durables.

Notre analyse montre que dans toutes les HES il y a des compétences et des groupes de travail actifs dans le domaine de l'eLearning, même si l'intensité de l'activité et les ressources à disposition varient d'école à école. Les programmes fédéraux, le Campus virtuel suisse et Creatools ont joué un rôle clé dans ce développement. Malgré tout, la situation est fragile dans de nombreux cas : la plupart des groupes sont de petite taille et dispersés, et le soutien de la part de la direction des écoles est géné-ralement faible. De plus, pour une grande partie des HES, un centre de support au niveau de l'en-semble de l'école doit encore être créé. Il existe donc un réel risque que dès que les programmes fédéraux arrivent à terme, une minorité seulement des HES réussisse à adopter l'eLearning à gran-de échelle. Cette situation est largement due à des contraintes de type structurelles : les HES sont plus petites et géographiquement plus dispersées que les universités. La direction et les unités cen-trales des HES sont plutôt faibles et ces écoles sont engagées dans un processus de restructuration qui implique que l'eLearning n'est pas considéré comme une priorité. Par conséquent, nous esti-mons qu'il est nécessaire de reconsidérer la stratégie dans ce domaine pour que les HES puissent exploiter le potentiel de l'eLearning pour leur développement. Nous proposons dès lors quatre séries de mesures :

1) L'eLearning doit être considéré comme une opportunité pour le développement des HES et la résolution de certains problèmes tels que le rassemblement d'une masse critique pour les diffé-rentes filières ou le lancement de nouveaux cours de master. A cette fin, chaque HES doit au cours des trois prochaines années élaborer un plan stratégique qui réponde aux questions sui-vantes. Dans quels buts l'eLearning sera-t-il utilisé et comment est-il lié au développement géné-ral de l'école en question ? Quels sont les scénarios d'adoption possibles? Pour quelles filières? Sous quelles formes ? Comment le soutien pour la réalisation de ces applications sera-t-il fourni ? Quelles infrastructures et ressources seront nécessaires et comment seront-elles acquises ?

2) L'eLearning doit être considéré comme un ensemble d'outils pour le réaménagement des filières pour améliorer leur qualité, pour développer de nouvelles méthodes d'apprentissage et pour atteindre de nouveaux publics. Ceci implique que l'eLearning soit intégré dans les phases de pla-nification didactique et éducationnelle. L'introduction du système de Bologne est une opportu-

nité historique puisque de nombreuses filières doivent être restructurées. Certains scénarios possibles comprennent l'adoption de l'eLearning comme soutien de cours délivrés en présence (matériel des cours on-line; contact avec le professeur); l'offre de filières spéciales avec un nombre réduit d'heures de présence pour répondre aux besoins des étudiants qui travaillent, ou encore l'offre conjointe de filières de la part d'institutions différentes (par exemple au niveau des master).

3) Les stratégies de soutien doivent être réexaminées car le modèle qui prévoit un centre de soutien pour chaque école n'est pas adapté à l'organisation des HES. Les solutions régionales doivent être favorisées et les complémentarités entre divers centres, exploitées.

4) Étant données les dimensions contenues des HES, la coopération entre les différentes écoles doit être amplifiée, non seulement pour des projets ponctuels, mais aussi à travers des accords concernant des programmes éducationnels, la prestation des services et la mise à disposition des infrastructures. L'expérience d'autres pays montre que la coopération est essentielle pour le développement de l'eLearning, spécialement quand les écoles sont petites et le marché est limité. De plus, une plus forte coordination nationale est nécessaire en ce qui concerne par exemple les centres de soutien, les Intellectual Property Rights et la technologie. Par conséquent, nous recommandons un renforcement du groupe eLearning de la Conférence suisse des hautes écoles spécialisées (CSHES), dans la perspective d'une meilleure coordination avec le programme du Campus Virtuel Suisse.

Abstract

This report presents the results of a study commissioned by the Federal Office for Professional Education and Technology and conducted by the NewMedia in Education Laboratory of the Università della Svizzera italiana on eLearning in the Swiss Universities of Applied Sciences (UAS). The aims were to assess the state of development of eLearning in UAS. Secondly, visits were made in Finland, Germany, and the Netherlands to compare the situation of a sample of European schools with Swiss counterparts, and to identify best practices. Finally, a series of measures are recommended to put eLearning in UAS on a more sustainable basis.
Our analysis shows that in all UAS there are competences and active groups in eLearning, even if the level of activity and of resources varies from school to school. The federal programmes, Swiss Virtual Campus, and Creatools played a key role in promoting this development. However, the situation is in many cases fragile: most groups are small and dispersed, and support from the school management board is generally weak. Also, in most UAS a solution for a support centre at the level of the whole school has yet to be found. Thus, there is the risk that, when the federal programmes expire, only a minority of UAS is able to adopt eLearning on a large scale. Structural features of UAS are largely responsible for this situation: UAS are smaller than universities and geographically dispersed. The school management board and central units are rather weak and these schools are engaged in a process of restructuring and thus eLearning is not seen as a priority issue. Thus, we argue that a rethinking of the strategy in this domain is necessary, if UAS are to exploit the potential of eLearning for their development. We propose four sets of measures:

1) eLearning must be considered as an opportunity for the development of UAS and to solve some issues, like achieving critical mass in curricula or developing master courses. To this end, each UAS should prepare over the next few years a strategic plan, answering the following questions. For which objectives will eLearning be used and how is it related to the overall development of the school? Which are the main adoption scenarios? For which curricula? In which forms? How will support be provided to deliver these applications? Which infrastructure and resources are needed and how will they be provided?

2) eLearning has to be considered as a set of tools to redesign curricula to enhance their quality, to develop new ways of learning and to reach new publics. This means that it has to be integrated in didactics and educational planning. The introduction of the Bologna model is an historical chance in this sense, since many curricula will have to be redesigned anyway. Some scenarios are the adoption of eLearning as a support for presence courses (course materials on-line, contact with the teacher), the design of curricula with reduced presence activities to suit the needs of working students, joint offer of curricula by different institutions (for example at master level).

3) Support strategies have to be revised, since the model of a support centre for each school is not suited to the organization of UAS. Instead, regional solutions should be preferred and complementarities between different centres exploited.

4) Given the size of UAS, cooperation between schools has to be developed further, not only for projects, but also for agreements concerning joint educational programmes and provision of services and infrastructure. Other countries show that cooperation is essential to develop eLearning, especially where schools are small and market opportunities limited. Moreover, there is a need for stronger national coordination concerning for example support centres, Intellectual Property Rights, and technology. Thus, we recommend that the eLearning group of the Swiss UAS conference be reinforced, in view of a better coordination with the Swiss Virtual Campus programme.

The authors

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He has worked as political consultant and in the management and administration of research in Switzerland. He was national expert at the European Commission for the FAST program (Forecasting and Assessment in Science and Technology) in 1994; he has worked also for the Swiss Science Council as an expert in the field of Technology Assessment. Since 1997 he is responsible of the Research office of the Università della Svizzera italiana, where he is in charge of the promotion and overall coordination of research activities. Since 2001, Benedetto Lepori manages the Educational Management in the Swiss Virtual Campus mandate.

Chiara Succi graduated in Communication Sciences at the Università della Svizzera italiana in November 2002. She works as a scientific researcher at the NewMinE Lab, a laboratory focused on education and technology at the University of Lugano, where she collaborates to projects, coordinates the promotion of events and cares public relations with companies and partners. Since 2001, she focused her research activities on the EDUM project - Educational management in the Swiss Virtual Campus - (www.edum.ch). From March 2003, she is enrolled in a PhD course centered on Communication and eLearning within companies.

Table of contents

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List of abbreviations

BFH	**Berner Fachhochschule**
CTI	Commission for Technology and Innovation
ECTS	**European Credit Transfer System**
EIF	Ecole d'Ingénieurs, Fribourg
FFHS	**Fernfachhochschule Schweiz, Brig**
FH	Fachhochschule
FHA	**Fachhochschule Aargau**
FHBB	Fachhochschule der beider Basel
FHNW	**Fachhochschule Nordwestschweiz**
FHO	Fachhochschule Ostschweiz
FHSO	**Fachhochschule Solothurn**
FHZ	Fachhochschule Zentralschweiz
HES-SO	**Haute Ecole Spécialisée de la Suisse Occidentale**
HSW	Hochschule für Wirtschaft, Luzern
HTI	**Hochschule für Technik und Informatik, Biel**
HTW	Hochschule für Technik und Wirtschaft, Chur
ICT	**Information and Communication Technologies**
IPR	Intellectual Property Rights
KFH	**Konferenz der Fachhochschulen der Schweiz**
LMS	Learning Management System
NDS	**Nachdiplomstudium**
OFS	Federal Office of Statistics
OPET	**Federal Office for Professional Education and Technology**
PHZH	Pedagogische Hochschule Zürich
SME	**Small and Medium Enterprises**
SUPSI	Scuola Universitaria Professionale della Svizzera Italiana
SVC	**Swiss Virtual Campus**
UAS	Universities of Applied Sciences
VFH	**Virtual Fachhochschule, Lübeck**
ZFH	Zürcher Fachhochschule
ZHW	**Zürcher Hochschule Winterthur**

1 Introduction

This report presents the results of a study realised by the New Media in Education Laboratory of the Università della Svizzera italiana (www.newmine.org) on the adoption of eLearning in the Swiss Universities of Applied Sciences (UAS). Thus, the domain considered here covers the seven Universities of Applied Sciences (Fachhochschulen) which were created in the second half of the 1990s, as a result of the reorganization of the tertiary professional schools. As we will discuss in Ch. 2, this process of reorganization is far from complete and this has far-reaching consequences on the modes of adoption of eLearning in these schools.
More precisely, the objectives of the study were the following:
- to assess the diffusion of eLearning in the Swiss UAS, as well as the present strategies of the UAS boards;
- to compare this development with other European countries having a UAS sector and to identify strengths and weaknesses of the Swiss situation;
- to identify best practices in Swiss and foreign institutions suitable to be adopted by the Swiss UAS;
- to identify the specific strengths and possible specialisations of UAS in eLearning activities (including complementarities with universities) and to make propositions for a UAS-specific strategy in the eLearning domain.

For comparison, we have chosen Germany, Finland and the Netherlands; all of which share with Switzerland the fact of having a "binary" higher education system, i.e. a system where, alongside universities, there exists a specific group of higher education institutions oriented towards professional training (Fachhochschulen in Germany; Polytechnics in Finland; Hogescholen in the Netherlands; see Ch. 3). Germany may be considered as the prototype of a binary system, since Fachhochschulen were created there back in the 1970s. Finland is a particularly interesting case given the importance of ICT for its scientific and technological development. Finally, the Netherlands stand out as a particularly innovative higher education system, where new concepts (like portfolio or vouchers to support students in higher education) find application.
The study was mandated by the Federal Office for Professional Education and Technology and follows an analogous survey carried out in 2003 on Swiss Universities and Federal Institutes of Technology commissioned by the Swiss Virtual Campus Programme (Lepori and Succi 2003).

In the introduction, we begin by outlining some definitions and we review the existing evidence on the adoption of eLearning in higher education, thus identifying also the possible specificities of the Universities of Applied Science in eLearning. We then present the methods and sources used for this report, as well as the organization of the content. Finally, we briefly describe the Educational Management mandate and its main results.

1.1 Definition and modes of eLearning

The adoption of Information and Communication Technologies in education comprises an exceedingly wide range of applications, ranging from the use of Web sites to deliver course materials to fully on-line courses which can be attended through Internet. To designate this complex of applications, we adopt the word eLearning, defined by the European Union as "the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (CEC 2001: 2). The advantage of this term is its being largely free from pedagogical and/or technological assumptions. The problem is, of course, that this very general definition covers quite different applications and uses of ICT.

Following Tony Bates (2001), it is useful to classify the different applications on a continuum between classroom education and fully on-line delivery (for a more detailed presentation of the elearning concept and of possible applications, see the Edum Handbook EDUM 2003):

1. *Face-to-face classroom teaching:* 'traditional' activities involving teacher and students in the same place (syntopic) and at the same time (synchronous); technological supports are limited to standard desktop applications (like PowerPoint).
2. *Technology-enhanced face-to-face teaching:* like classroom lectures but supported by on-line materials or software simulations; their use normally entails a revision of the pedagogical approach adopted (e.g., replacement of face-to-face lectures with discussions based on preparatory reading of course materials).
3. *Mixed mode (reduced face-to-face + on-line) teaching:* here some activities, for example questions or exercises, are completely transferred to the new technologies (blended-learning approach).
4. *Distance education:* courses or degree programmes developed completely as 'distance'; enrolment, fee payment, lessons, communications, and examinations are managed from a distance with new technologies.

Face-to-face classroom teaching	Technology-enhanced face-to-face classroom	Mixed-mode (reduced face-to-face + on-line)	Distance education

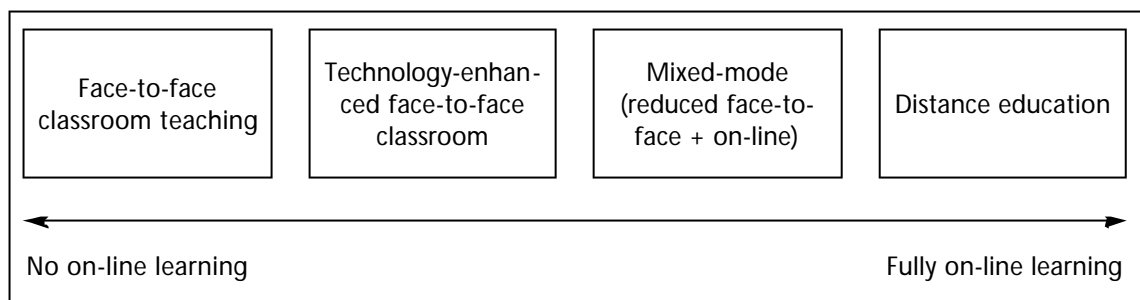No on-line learning   Fully on-line learning

Figure 1. Models of eLearning (Bates 2001)

The important point is that these applications are extremely different in terms of the technological tools employed, the delivery methods and the underlying pedagogical concepts, but also in terms of the organization of activities and of the necessary resources. For instance, supporting a classroom course might entail putting some documents and tools on the web, which requires very limited personnel resources, while the development costs of a fully on-line curriculum can be measured in millions of Swiss francs.

This means that the issue at stake here is not whether or not to adopt eLearning. As we will explain later, we think that eLearning as a support to presence teaching will inevitably become widespread in higher education institutions over the next ten years. However, the real issue for UAS is to identify the most suitable applications of eLearning for the development of their educational programmes and to understand if eLearning might open up new development opportunities or help solve some structural problems (like insufficient numbers of students in some curricula). Moreover, it is needed to create support structures and organization forms adapted to the chosen eLearning strategy and applications. These issues will constitute the main subject of the last chapter of this report (see Ch. 4).

1.2 ELearning in higher education

There is a large body of literature on the use of eLearning in higher education, mainly in the USA but also in Europe. However, until recently this literature focused merely on universities, and this is therefore the first ever report to examine the situation in UAS. The most useful sources are a study realized by the Centre for Higher Education Policy of the University of Twente (Collis and Van der Wende 2002) and the proceedings of a conference held in 2002 in Rotterdam, where presentations were held on the situation in most European countries (Wende and Ven 2003).

These studies come to a somewhat surprising conclusion, especially if compared with some American literature speaking of a revolution in higher education brought about by social changes and by the introduction of ICT. Namely, most European universities appear to make a pragmatic use of eLearning, adopted to improve the quality of their education rather than to develop new activities. eLearning, at least in its initial phases, tends not to entail radical changes in the mission and organization of universities.

A series of site visits we made in four European countries during 2003 (Lepori and Succi 2003) leads to similar results. Most universities are still in the experimental phase with eLearning, and its introduction is largely bottom-up. Universities create central support structures to help projects, but do not attempt explicitly to steer eLearning development towards corporate strategies. However, we could find some examples of more innovative approaches, like the Polytechnic of Milan developing an on-line curriculum in informatics or the University of Barcelona creating a subsidiary to deliver continuing education courses in Latin America. In a more recent paper, we argued that these models can be largely explained through the specificities of the national higher education governance structures (Lepori and Succi 2004a). Thus in most European countries, market incentives are less important than in the UAS and thus opportunities to get additional revenues through eLearning are smaller. Moreover, school management is on the whole weaker than in most American universities and thus the board is less able to develop and impose a unitary eLearning strategy; hence, the rather decentralized approach adopted in European universities.

The Swiss situation appears to be not dissimilar from that in the neighbouring European countries. Thus, there are a large number of projects and experiences in eLearning scattered in almost all departments, including some very specialized centres. Moreover, about half of the universities have a clearly identifiable support centre for the production and the maintenance of eLearning applications. What is notable in the Swiss approach is that there are practically no distance curricula - with the only exception of Geneva's Bachelor in theology- and that most activities are in fact designed to support presence courses.

1.3 Methodology and sources

This report is based on documentary information and on a series of interviews and site visits to Universities of Applied Sciences in Switzerland and in three foreign countries (Finland, Germany and the Netherlands).

In Switzerland, we recorded a total of 13 interviews with UAS, as well as some supplementary interviews with experts in the domain. The interviews were integrated with information from the web sites of the schools and from official documents, in particular from the eLearning strategies submitted to OPET at the end of 2003. The short description of the situation in each UAS was then sent back to our addressees for integrations and corrections.

The three foreign case studies are based on literature reviews on higher education and eLearning in each country (see the references in the country reports) and on three study trips we went on between February and June 2004, when we visited the following schools:

- In Germany: the Virtuelle Fachhochschule in Berlin and the Zentrale für Fernstudium in Fachhochschulen in Koblenz;
- In Finland: the Virtual Polytechnic in Tampere, the Häme Polytechnic in Hämelinne and the Helia Polytechnic in Helsinki;
- In the Netherlands: the SURF Foundation and the Hogescholen In-Holland (Den Haag), Fontys (Eindhoven) and Utrecht.

The country reports were sent back to the interviewees as well to some national experts, for corrections and integration.

A draft version of this report was then discussed with people active in the eLearning domain in the UAS during a workshop held in Bern 25 August 2004. Finally, we would like to thank Mr Marcel Sieber of the Federal Office for Professional Education and Technology, as well as Mr Federico

Flückiger, president of the KFH eLearning group, for useful discussions and suggestions on the contents of this report.

1.4   Organization of the report

Following this introduction, the report is organized in three chapters. In Ch. 2, we present in detail the state of development of eLearning in the Swiss Universities of Applied Sciences and we show the relationship with the organization of each school. In the following chapter, we review the situation in the three foreing countries, and we present some models of adoption which could be useful also in the Swiss case. A more detailed presentation of these case studies is given in the three national reports published together with this document. Finally, in Ch. 4 we discuss the implications of these findings for Swiss UAS and we propose some directions for the development of strategies and organizational forms suited to the Swiss situation.

1.5   The educational management project (EDUM)

At the end of 2001, the Swiss Virtual Campus Programme mandated the NewMedia in Education Laboratory of the Università della Svizzera italiana to examine the conditions for the successful adoption of eLearning activities in Swiss higher education institutions, focusing in particular on the projects financed by the Swiss Virtual Campus. The Educational Management Project examined the strategies for use and maintenance of the Swiss Virtual Campus projects (Lepori and Rezzonico 2003) and carried out an assessment of the development of eLearning in Swiss Universities, comparing it with the neighbouring regions (Lepori and Succi 2003). More recently, the project has published a handbook on how to realise and manage eLearning activities, where the main issues for such projects are presented in a condensed and accessible form to beginners in the field (EDUM 2003).
Besides its interest for higher education policy and management, this work is leading to a comparative analysis of eLearning adoption patterns in different countries and to their explanation through the differences in higher education organization and governance (in particular between USA and European countries; Lepori and Succi 2004).
All reports and publications are available in pdf format on the EDUM website (www.edum.ch).

EDUM reports
- Lepori B., Rezzonico S. (2003), La realisation de cours elearning. Le cas du Campus Virtuel Suisse.
- Lepori B., Succi C. (2003), eLearning in higher education. Prospects for Swiss Universities.
- EDUM (2003), How to realise and to manage an eLearning activity, EDUM handbook.
- Lepori B. Succi C. (2004), eLearning in the Swiss universities of applied sciences.

2 The situation in the Swiss UAS

In this chapter, we present a detailed analysis of the level of development of elearning in the Swiss Universities of Applied Sciences, focusing on two major issues: the existing projects and applications of elearning on the one hand, and the creation of support centres at the level of the whole school (or of its subunits) on the other hand.

The chapter is organized as follows. Firstly, we review some important structural features of Swiss UAS that influence the development of eLearning. Secondly, we present the existing support programmes at the national level and, especially, the measures provided by the Swiss Virtual Campus programme to support eLearning in the UAS. Further, we analyse in detail the situation in each individual UAS. Finally, we draw some conclusions and we review the most important strong and weak points concerning eLearning in Swiss UAS.

Information provided in this chapter is based on a series of interviews with people in charge of eLearning in each school, as well as with other persons active in the domain. We have also reviewed the information present in the websites of each school. This information reflects the status in summer 2004.

2.1 Swiss Universities of Applied Sciences: an overview

In Switzerland, universities of applied sciences were first created in 1997-98 on the basis of the UAS Act of 1995 (Conseil fédéral 1994) by grouping and reorganization more than sixty tertiary-level professional schools in the fields of technology (including informatics), economics and management, and applied arts. The rationale of this reorganization was to upgrade these schools and to extend their mandate from education to applied research and technology transfer (especially towards SMEs). Like Germany, Finland, and the Netherlands (see Ch. 3), Switzerland opted for a binary higher-education system, composed of schools oriented towards general education and fundamental research (cantonal universities and federal institutes of technology) and of schools oriented towards professional education and applied research (Huisman and Kaiser 2001).

The reorganization aimed to create a relatively small number of schools covering most of the domains and with a sufficiently large number of students and geographical domain. As a result, seven UAS regions were defined, each covered by a single school:

1.   SUPSI: Scuola Universitaria Professionale della Svizzera italiana;
2.   HES-SO: Haute Ecole Spécialisée de Suisse occidentale;
3.   BFH : Berner Fachhochschule ;
4.   FHZ : Fachhochschule Zentralschweiz ;
5.   FHO : Fachhochschule Ostschweiz ;
6.   FHNW : Fachhochschule Nordwestschweiz ;
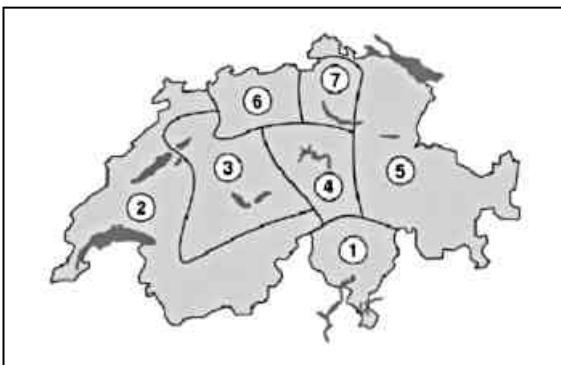7.   ZFH : Zürcher Fachhochschule.

Figure 2. The seven UAS regions

As a consequence, only three schools (SUPSI, BFH and ZFH) are ruled by a single Swiss canton, while the other four are located in more than one canton, with the extreme cases of HES-SO (seven cantons) and of FHO (eight cantons).

At present, the seven UAS together have approximately 38,000 students, of which 32,000 in about 200 basic diploma curricula (see Figure 3). Thus, UAS are much smaller than most cantonal universities and the number of students for each curriculum is comparatively low (even though with large differences depending on the domain). An important feature of the UAS is their provision of curricula for working people, both at diploma level (*Berufsbegleitend* - 7,000 students) and of postgraduate curricula (5,500 students), as well as the extensive supply of courses in continuing education. UAS are undergoing a process of expansion, especially because of the integration of existing schools in additional domains. Thus, the integration of the tertiary schools in the domain of social work, health and the arts will be realized in the next few years; which is also the case, in some cantons, of the teacher training schools. The number of students should then strongly increase in coming years: according to the latest estimates of the Federal Statistical Office, the number of students in diploma curricula is expected to increase from 32,000 in 2002 to 52,000 in 2013 (Office fédéral de la statistique 2004).

The curricula are also being completely reorganized, since the Conference of the Swiss UAS has decided the introduction of the Bachelor-Master model (Bologna model), in parallel with the universities. Thus, by 2005 all three-year diploma studies will be transformed into Bachelor's programmes, corresponding to a workload of 180 ECTS, while starting in 2007/8 the UAS will offer professional Master's curricula corresponding to an additional 90-120 ECTS.

BFH: Berner Fachhochschule	5650
HES-SO/S2: HES de Suisse occidentale / HES Santé-Social romande	**7743**
FHNW: Fachhochschule Nordwestschweiz	5017
FHZ: Fachhochschule Zentralschweiz	**3149**
SUPSI: Scuola universitaria professionale della Svizzera italiana	1211
FHO: Fachhochschule Ostschweiz	**2991**
ZFH: Zürcher Fachhochschule	7900
Other schools (non integrated)	**4252**
Total	37913

Figure 3. Students of the Swiss UAS (2002). Source: Federal Office of Statistics.

2.1.1 Governance of the system

The governance structure of UAS is quite complex, being organized basically on four levels: national (Confederation), cantonal and intercantonal agreements, UAS management, and the individual schools. This structure determines largely the interplay of different actors in the development of elearning.

1) The Confederation is generally qualified to coordinate the UAS domain, thanks to its constitutional competence on professional education and through the 1995 UAS Act. The Confederation is thus responsible for the recognition of both the UAS and their curricula and diplomas; moreover, it partially finances their operations. Most tasks in this domain are delegated to the Federal

Office for Professional Education and Technology (OPET), which is in charge not only of preparing the government's decisions, but also of their execution in the UAS and professional education domain. Finally, the Federal Commission for UAS advises the government on UAS matters and, more particularly, on applications for recognition of new schools and study curricula.

The Conference of the UAS (Konferenz der Fachhochschulen - KFH) is an association founded by the seven UAS, which aims to coordinate their activities and defend their interests at the national level; it issues recommendations and guidelines for the individual schools on matters like implementation of the Bologna model, quality, eLearning, etc.

2) Though coordinated by a federal framework law, most UAS fall within the canton's jurisdiction and are subject to cantonal laws insofar as almost all tertiary-education schools that were merged into the UAS were cantonal schools. Today, we find three different situations:

- Three UAS (BFH, ZFH, SUPSI) cover only one canton and are thus subject to a corresponding cantonal law;
- Three UAS covering different cantons (HES-SO, FHZ, FHO) are based on an inter-cantonal agreement signed by all cantons; as a rule, the highest authority is a conference composed of the ministers of education of the corresponding cantons;
- The FHNW is based on a cooperation agreement between the cantons concerned (Basel, Aargau and Solothurn); while the three partner schools are still under the sovereignty of each canton, the agreement creates the basis for cooperation and coordination of the activities.

As a general rule, the ability of developing a common strategy and the strength of the central units of the UAS are greater for the schools based on only one canton than for the other UAS, where divergent interests between cantons might make the reform process more difficult and where each amendment of the regulations must be approved by each partner canton.

3) On average, each UAS was created by the grouping of about ten existing schools, each with its own management board, strategy, and history. The creation of central structures and the development of a common strategy is therefore an essential component of the UAS development. This process involves the creation of central governing bodies and services and the reorganization of the existing school and curricula to eliminate duplications between individual establishments.

The extent of realization of this process varies considerably from school to school (Commission fédérale des HES 2002). While SUPSI and FHZ have created extensive central structures and have been reorganized in departments, schools like HES-SO and FHNW are largely a holding of individual establishments run almost entirely autonomously. In general, the relations between the central structures and the individual schools are quite complex, differ from school to school and, in many cases, there are no central administrative structures corresponding to the rectorate and the central services in universities. Thus, the individual organization of each school largely restricts the possible strategies in the domain of elearning, as will become clearer further on in this chapter.

2.2 Support programmes and initiatives

We will see later that the development of eLearning in the Swiss UAS was largely due to impulse and funding from federal programmes. From the beginning, and funded by OPET, UAS have participated in the Swiss Virtual Campus programme. Among the 50 development projects in the impulse phase (1999-2003), 12 were led by a UAS, while UAS participated as partner in an additional 11 projects (see Figure 4). The overall funding from OPET amounted to SFr. 9 million Criteria for UAS projects were partially different from university projects, since the use of modules seemed to matter more in continuing education and, in fact, two UAS projects (Eduswiss on-line and MACS) concerned continuing education only. A look at Figure 4 shows that four out of seven UAS made up the bulk of the

participation in the SVC programme (BFH, FHNW, SUPSI, ZFH), while the other three schools (HES-SO, FHZ and FHO) were much less involved.

In the consolidation phase of the programme for 2004-07, UAS receive funding for new projects, as well as for the creation of a competence and production centre in each school.

In June 2004, 28 new Swiss Virtual Campus projects were definitively approved; five of which are conducted within UAS, while UAS participate as a partner in 12 additional projects (over 28 projects in total). OPET Funding to UAS will amount to SFr. 1,350,000 for two years.

Secondly, at the beginning of 2004 each UAS was due to present a concept for the creation of a competence and production centre; funding for these centres is allocated on the basis of the number of students and ranges from SFr. 89,000 (SUPSI) to SFr. 191,000 (ZFH and HES-SO) for 2004; these amounts are likely to be progressively curtailed in the next few years.

Moreover, in 2003 the KFH created an eLearning coordination group with the mandate of coordinating UAS participation in the SVC programme, as well as promoting the exchange of experiences and information between the schools. Besides discussing and evaluating the UAS projects in Swiss Virtual Campus, this group is preparing guidelines for the introduction of elearning in the UAS curricula.

Project title	UAS
Impulse programme	
e-DUCATION	BFH
Postgraduate Courses in a Hybrid Classroom using Mobile Communication	BFH
eduswiss online	BFH
Forum New Learning	BFH
CALIS - Computer-Assisted Learning for Information Searching	HES-SO
POLE - Project Oriented Learning Environments	FHNW
Development of a computer and web based course for the application of the finite element analysis (FEA) in structure mechanics	FHNW
H-bridge - Development, realisation, testing and implementation in the curricula of a course module entitled "H bridge" from the power electronics syllabus, which can be studied via the World Wide Web	FHNW
MACS - Continuous Education Modules	SUPSI
Fundamentals of Signals and Systems	ZFH
Biotechlab - Modelling and Simulation of Dynamic Systems - A Collection of Applied Examples	ZFH
Basic Principles of Oecotrophology	ZFH
Consolidation programme	
PeMathematics - Modules in Applied Mathematics	FHNW
Information- & IT Management online	FHNW
Develop your practical skills in biotechnology	ZFH
Colour	SUPSI
FABEL: Fallbasierte Einführung zu e-Learning	BFH

Figure 4. List of SVC projects run by the UAS

Finally, in 2002 OPET supported the Creatools program (www.creatools.ch), which financed 21 small-scale projects (between SFr. 20,000.- and SFr. 50,000.-) aiming to integrate elearning into UAS curricula. Creatools was particularly effective in promoting the integration of eLearning in educational activities throughout the UAS (Gertsch and Schneeberger 2004).

We conclude that UAS were actively involved in the national support programmes for elearning and in recent years received fairly significant funding to ensure its development.

2.3 The situation in the individual schools

Next, we examine in more detail the situation in each individual UAS. We begin with a short presentation of each school and its organization (largely based on the 2002 UAS Peer Review; Commission fédérale des HES 2002); we then describe existing activities and structures, as well as future prospects as detailed in the strategic plans. We conclude with some remarks and comments.

2.3.1 Berner Fachhochschule (BFH)

2.3.1.1 General information on the school

The Berner Fachhochschule is the outcome of the grouping of 13 existing schools, all located in Canton Bern. Some of these are cantonal schools, and others are private. The BFH also includes three federal schools, in the fields of agriculture (Zollikofen), sport (Macolin) and wood (Biel). These different organizational forms have complicated the creation of unitary structures.

The strategic plan of the UAS provides for the reorganization of the BFH in six departments, according to the main activity domains of the schools:

- Technology and Informatics (Biel and Burgdorf);
- Architecture, Construction, and Wood (Burgdorf and Biel);
- Arts (Bern);
- Economics, Administration, and Social Work (Bern);
- Agriculture (Zollikofen);
- Sport (Macolin).

This reorganization has already been implemented for the technological domain and will be complete by 2006. The direction of the school is composed of the rector and the heads of departments; a series of committees comprising representatives of the departments prepare issues at the UAS level, like the implementation of the Bologna model, research, quality assurance, etc. Each department has its own services.

2.3.1.2 Existing eLearning activities and centres

Existing eLearning activities at the BFH have mostly emerged from Swiss Virtual Campus projects and in particular from the Eduswiss on-line project (aiming to develop eLearning models for continuing education) and from the Forum New Learning project, working to create a community of eLearning practitioners in the Swiss UAS and to provide support (management of a WebCT server).

Following a complex history, these projects have given rise to two distinct teams:

- The first one in Biel (Hochschule für Technik und Informatik - HTI) around the net4net project (www.net4net.ch/home/; a competence network on new educational technologies in the framework of the Swiss network on information and communication technologies ICTnet) and the Eduswiss on-line project (www.edol.ch)
- the second one in Bern (Hochschule für Wirtschaft und Hochschule für Technik und Architektur) around the Forum New Learning mandate (www.fnl.ch).

At present, the team in Biel comprises five members and the team in Bern two.

The choice to create a competence centre for the BFH seems to have led to some conflicts between the two teams; in November 2003, the school board decided to assign to the HTI in Biel the task of creating the support centre based on the net4net team. In spring 2004, the teams in Biel and Bern established a co-operation for a joint responsibility for the competence centre.

The centre should provide training activities and advice to professors on how to use eLearning, as well as software tools for eLearning courses production and delivery. Its implementation, however, is still in its initial phase. The general philosophy is to promote "low-tech" applications to support existing courses with rather simple tools and meet the teachers' requirements.

Further, there seems to be some isolated activities in other BFH schools, but an overall vision is lacking.

2.3.1.3 Future prospects

According to the persons interviewed, prospects for the development of eLearning at the BFH are rather vague at the moment. On the one hand, the school board is fully engaged in the reorganization of the school and in the introduction of the Bologna model, so that eLearning is not high on the agenda. On the other hand, the competence centre still lacks definition in terms of its management and implementation.

The BFH sought the collaboration with the University of Bern on the issue of eLearning; however, this cooperation is difficult since at the moment the University doesn't have its own competence centre.

2.3.1.4 Comments

Despite the existence of significant expertise in the area of eLearning, the situation at the BFH seems to be complicated for structural reasons. The whole UAS is still engaged in a complex process of restructuring and there seems to be little scope for developing a unitary strategy for eLearning. Delegation of this task to a single school was probably the only possibility at the beginning. The going together of the teams in Biel and Bern has raised the chance, that the new support centre will be able to reach the whole school and to federate existing initiatives in elearning.

Moreover, cooperation with the University of Bern, where no decisions on a competence centre have yet been taken, is difficult; thus, unlike the cases of Basle, Zurich or Ticino, the BFH lacks a university partner able to provide services and support in specialized domains.

2.3.2 Fachhochschule Zentralschweiz (FHZ)

2.3.2.1 General information on the school

The Fachhochschule Zentralschweiz is a joint venture of six cantons of the region; however, its five schools are all located in Lucerne and include:

- the Hochschule für Technik und Architektur (HTA);
- the Hochschule für Wirtschaft (HSW);
- the Hochschule für Gestaltung und Kunst (HGK);
- the Hochschule für Soziale Arbeit (HSA);
- the Musikhochschule Luzern (MHS).

With approximately 3,000 students, the FHZ is much larger than the University of Lucerne. The process of reorganization of the school has been slowed down by difficulties in the ratification of the intercantonal agreement. However, the FHZ has a good developed central structure (school council, central direction), as well as of some central services.

2.3.2.2 Existing eLearning activities and centres

Until recently, the FHZ has not been very active in the eLearning sector at least in the Swiss Virtual Campus program. The school that has developed most in this area is the Hochschule für Wirtschaft, which is offering an elearning postgraduate course on Dienstleistungsmarketing und -Management (http://www.nds-dlm.ch/) based on 50% of the lectures online; postgraduate courses on Unternehmensführung (http://www.hsw.fhz.ch/, learning platform: http://www.vcampus.ch/bin/index.pl) and one on Cooperate Finance in partnership with the University of Zurich (http://www.getinvolved.unizh.ch/lu/). The Hochschule für Technik und Architektur is operating the elearning course "Heizungstechnik" with 50 hours of online learning (http://www.vcampuslu-zern.ch/). Several other initiatives on diploma courses are also implemented with a blended learning approach guided by the Professors.

In autumn 2002, the FHZ direction decided to commit itself stronger to elearning. To this aim, the Fachstelle Neue Lernmedien (http://e-learning.fhz.ch/) has been established in September 2003 as a service directly attached to the UAS direction, closely cooperating with the pedagogical service of the UAS. According to actual plans of finances, the Fachstelle can dispose of a budget of about 550'000 Sfr. in 2004 (including the SVC contributions) splitted as follows:

- salaries for 1,5 professors in the central unit;
- a 10% post in each of the 5 partner schools to support diffusion of elearning;
- a 10% post for the coordination of activities within the pedagogical service;
- financial means for the development including operating of the elearning infrastructure (LMS, authoring and distribution and other tools as BSCW etc.) and the support of teachers in the development of blended learning courses,
- financial means for the realization of larger internal projects on at least FHZ-level.

Until now, the Fachstelle has realized three development projects for additional modules to be adopted in the FHZ curricula to complete the education of students. Part of the postgraduate course-offering is hosted on BlackBoard and two older generation LMS by the University of Lucerne. The decision to install and offer ILIAS (http://www.ilias.de/) as a single LMS for all the schools of the FHZ was taken in spring 2004 in order to support requirements for accompanied self-instruction and sharing modules all over the partner schools.

2.3.2.3 Future prospects

The FHZ foresees for the next years the development of a strategy plan to introduce elearning both in basic education and in vocational training. The Fachstelle Neue Lernmedien, operating as elearning competence centre for the FHZ, is charged to develop and implement this strategy within the individual schools. It is addressed to coordinate further strategies along with the elearning unit of the University of Lucerne as well as to share resources and infrastructure.

2.3.2.4 Comments

In Luzern eLearning is strongly supported by the UAS management, who are willing to invest as necessary. Compared to other schools, the size of the support centre and the related investment are reasonably large. The structure of the UAS allowed also the creation of a single centre for the whole institution, avoiding fragmentation. Also, the strategy of having a contact person in each school seems to be very sound.

However, if measured against the existing projects and applications of eLearning, the FHZ seems to be relatively less developed. Also, the Fachstelle Neue Medien has been created only one year ago and thus could develop until now only a limited number of projects.

Finally, a central issue is the collaboration with the University of Lucerne (Virtueller Campus Luzern project; http://www.vcampusluzern.ch). Although some collaboration exists, like the use of LMS managed by the University at the HSW, there are signs of lacking coordination and cooperation.

For instance, the FHZ decided recently to install its own LMS, while at the same time the University offers a commercial LMS; of course, there are some reasons for these different choices, but given the size of the schools there is a risk of consuming resources for infrastructure which could be better used for teachers support. Also, we are of the opinion that training offer in elearning should be developed jointly, avoiding duplications.

In February 2004, the FHZ direction decided, on proposition of the Fachstelle Neue Lernmedien, to discuss with the University if there is a willingness to fusion the two competence centers in one unit and to develop a common elearning infrastructure. Given the size of the schools and the resources available, we are of the opinion that this option must be absolutely pursued.

2.3.3 Fachhochschule Ostschweiz (FHO)

2.3.3.1 General information on the school

The Fachhochschule Ostschweiz covers eight cantons in Eastern Switzerland, and includes the Principality of Liechtenstein in the school in Buchs. After a reorganization process, the original seven schools were reduced to four interdisciplinary institutions:
- Hochschule für Wirtschaft, Technik und Soziale Arbeit Sankt Gallen ;
- Hochschule für Technik Rapperswil
- Hochschule für Technik und Wirtschaft, Chur
- Interstaatliche Hochschule für Technik, Buchs

Each institution enjoys considerable autonomy and has its own strategy and management structures, while the UAS level is in charge of the overall coordination and of the networking between the schools. In particular, the integration of the HTW Chur is seen as problematic.

With less than 3,000 students, the FHO is, after SUPSI, the smallest Swiss UAS; totalling 1,200 students, the Hochschule für Wirtschaft, Technik und Soziale Arbeit Sankt Gallen is the largest school.

2.3.3.2 Existing elearning activities and centers

Existing eLearning activities are concentrated at Chur and at Rapperswil, while in the two other schools there seems to be little activity.

In Chur the Institut für Pedagogik und Kommunikationstechnologies (www.ipkt.ch) manages the Claroline LMS (http://www.claroline.net/) and offers it to the teachers of the school; moreover, BSCW is offered for group work. Claroline is used in NDS Informatik und Dokumentation to deliver course materials to prepare classroom discussion. Resources from the school for eLearning development are in the order of magnitude of 25% time-equivalent.

In Rapperswil, the Institute für Internet Technologien und Anwendungen (http://www.ita.cnlab.ch/community/index.cfm) has developed a series of eLearning applications through European, Swiss Virtual Campus, and Creatools projects. Moreover, the Institute manages the Cisco Networking Academy for Eastern of Switzerland.

2.3.3.3 Future prospects

At the beginning of 2004, the UAS management mandated the HTW Chur to develop an eLearning competence centre for the whole school, a previous concept presented by Rapperswil having been judged too expensive. The involvement of all partner schools in eLearning activities is considered a priority, an issue to be brought to the top of the school management's agenda.

At the organization level, the centre will work through projects and specific mandates, with only a very small part (10% of the time) devoted to coordination and with no central unit. The first project launched in spring 2004 is the elaboration of an eLearning strategy for the school, in cooperation with the University of St Gallen. Based on this strategy, other activities will be developed through projects and precise mandates.

2.3.3.4 Comments

It seems that the degree of involvement in eLearning of the school management (both at the level of the UAS and of the individual establishments) is very low; for instance, the concept for a competence centre had to be significantly reduced because the schools are not ready to invest significant funds in eLearning development. At the same time, despite some interesting initiatives, the level of development of eLearning seems limited to isolated initiatives and projects and a critical mass is lacking. Similarly, the decentralized organization of the schools makes it more difficult to involve - starting from Chur - the other partner schools in eLearning development activities.

Even if the low-level profile chosen for the competence centre is apparently the only one possible in the circumstances, a reflection is needed on strategies and development forms. We think that the size and the dispersion of the UAS makes not very realistic the creation of a support centre for the whole school and that cooperation solutions with university centres (Sankt Gallen and Zurich) should absolutely be examined.

2.3.4 Fachhochschule Nordwestschweiz (FHNW)

2.3.4.1 General information on the school

The Fachhochschule Nordwestschweiz has approximately 4,200 students and comprises three partner schools, the Fachhochschule Aargau (FHA), the Fachhochschule Solothurn (FHSO) and the Fachhochschule beider Basel (FHBB). The FHNW is based on a cooperation agreement between the Cantons of Basel, Solothurn and Aargau: formally, it is directed by a cooperation council composed by the heads of the three schools and by representatives of the cantons.

However, for the moment, the FHNW is to be considered as a loose cooperation of the three partner schools; a common structure and strategy is still in the process of being developed. Thus it was classified as the least developed of the seven Swiss UAS by the 2002 Peer Review, even though the individual schools received quite good rankings. The development of common structures is complicated by the fact that the school is based on an inter-cantonal agreement and by the competition between the participating cantons. After a public consultation an inter-cantonal contract is due to be dealt with in the four cantonal parliaments in autumn 2004.

This situation has obvious implications for eLearning. It is very difficult to develop a common eLearning strategy or common activities, because of the lack of an overall strategy and the cost of coordinating distinct centres in each of the partner schools.

2.3.4.2 Existing eLearning activities and centres

Since 2002, on the FHNW web site there has been a section on eLearning (http://www.hsw.fhso.ch/e-learning/). It gives an overview on contacts and activities in the UAS on eLearning, but also shows that activities in this domain are separated for each partner school, each having its own support teams, projects and newsletters.

a) Fachhochschule beider Basel

In 2002, the Department of Economics of the FHBB developed a strategy for eLearning and created a small support unit headed by Urs Gröhbiel (20% work time + 40% for an assistant; http://dwi.FHBB.ch/wiba/wiba.nsf/pages/e-learning-support). The main activity is consulting and support for teachers in the development and evaluation of eLearning courses. There are at the moment 14 eLearning courses in the department, of which eight are hybrid courses (delivered in part through on-line lectures), while the rest are web sites with materials for presence lectures.

The unit cooperates with the Learntechnet of the University of Basel and with the ETHZ, thanks to the appointment of U. Gröhbiel at the NET (www.net.ethz.ch); a framework agreement with the Learntechnet for the exchange of services is currently being negotiated. The board of the school has

recently announced the intention to extend the support activity to the other departments, where most activities are still developed through individual projects.

The FHBB is leading house in a SVC project in the technology sector (www.leistungselektronik.ch).

b) Fachhochschule Aargau

At the FHA Aargau, there are more than ten projects for the development of eLearning courses, including the leading house of two SVC projects:

- the Project Oriented Learning Environment - POLE Europe; http://www.pole-project.ch and http://www.pole-europe.ch an e-learning project, based on an international network of European universities
- the project "Development of a computer and web based course for the application of the finite element analysis (FEA) in structure mechanics";

The most active departments seem to be the Schools of science and technology and of education.

At the beginning of 2003, the school board established an official group for eLearning, with the mandate of coordinating existing eLearning activities, proposing support activities and participating in the activities at the level of the FHNW (http://www.fh-aargau.ch/main/Show$Id=2487.html). It is composed of two representatives of the Department of Education (Armin Schlinger and Arnold Wyrsch) and one representative of the Department of Science and Technology (Rudolf Käser). The group organizes a forum for the development of an eLearning strategy of the FHA with regular guests from FHBB and FHSO. The platform webcorp (www.webcorp.ch), offers a support for entry level eLearning.

c) Fachhochschule Solothurn

At the Fachhochochschule Solothurn there is a small support group for eLearning chaired by Chandra Holm (http://www.hsw.fhso.ch/e-learning/support_fhso.htm). Main activities are the organisation of events and information and diffusion activities for teachers.

2.3.4.3 Future prospects

In view of achieving a common structure in Northwestern Switzerland, the board of directors of the three schools decided in November 2003 to establish a task force for eLearning at the FHNW. Recently, this working group with representatives of the three schools has developed an eLearning strategy for the whole of UAS. One of the first activities of this group has been to perform an assessment of the use and attitudes of teachers and students towards eLearning. The results show that eLearning (broadly defined) is widespread in the FHNW, but that more specific tools (like LMS) are much less popular. The acceptance of eLearning and the expectations for future use are very high; however, more developed support activities as well as improvements in the infrastructure would be necessary to answer these needs.

These activities are a clear sign that cooperation between the eLearning groups of the three schools is feasible. However, the situation is more complex concerning the creation of a competence centre for the whole UAS. Our interviews show that the groups in the schools have quite different orientations, at the FHBB towards the University of Basle, in Aargau towards ETH Zurich, and that the solution of one common centre in a single location is seen as unrealistic. However there are also common interests such as support from - and cooperation with - third parties such as the forum new learning and other institutions of higher education (like ETH Zurich). The eLearning strategy developed by the working group therefore suggests complementing the existing decentralized support structure with a central coordination function and general services. The strategy paper is due to be discussed and put into effect by the board of directors.

2.3.4.4 Comments

It is important to underline the good level of development of eLearning activities and support measures in the partner schools of FHNW. All three schools have support teams for eLearning and a large number of projects are under way; the strategy of providing decentralized support in each school, thus very close to users, seems to be very sound especially for the simplest applications of eLearning. However two major limitations in this strategy deserve attention:

- firstly, the support units are of necessity small and thus might be short of some competences, for example in technology (maintenance and management of tools), IPR, etc.; the strategy of providing these resources through an agreement with larger centres should be pursued more actively and supported at the institutional level;
- secondly, this strategy fits in well with rather simple uses of eLearning as a support to existing courses (blended learning), but probably not with the development of more advanced applications or fully on-line courses; the existing units are support and consultancy rather than development centres.

2.3.5 Zürcher Fachhochschule (ZFH)

2.3.5.1 General information on the school

The Zürcher Fachhochschule (about 7,400 students) is the largest Swiss University of Applied Sciences. It is composed of eight schools, of which six are located in Zurich, one in Winterthur and one in Wädenswil. The Zürcher Hochschule Winterthur is the largest school with some 2,300 students.

Today, the ZFH has a holding structure, where each partner school is largely autonomous and basically decides on the organization of curricula, on research, as well as on personnel matters. At the central level, there is a UAS council, composed of seven members, and a secretariat, which is hosted by the Office of University Affairs of the Canton Zurich. Each school has its own rector and school council, as well as its services and administrative bodies. The UAS 2002 Peer Review also noted that the ZFH was not really integrated and had no global strategy.

However, a new organization providing for a much stronger central structure has been recently approved and should be implemented by 2006. According to this scheme, the UAS will be reorganized in three schools, in the domains of applied sciences, the arts, and pedagogy. The UAS management will consist of the directors of the three schools and a central administration and services will be created.

2.3.5.2 Existing eLearning activities and centres

eLearning activities and support measures are distributed among many of the ZFH institutions, though with large differences between the individual schools. The most significant activities are located at the Zürcher Hochschule Winterthur, at the Pädagogische Hochschule Zürich, at the Hochschule für Angewandte Psychologie in Zurich, and at the Hochschule Wädenswil.

The participation of the ZFH in the Swiss Virtual Campus Programme has been described as relatively poor compared to the school size. As a whole, the ZFH has been conducting three SVC projects (1 in Winterthur and 2 in Wädenswil).

The Zürcher Hochschule Winterthur is the leader of the SVC project Internet-based course on Fundamentals of Signals and Systems. Based on this experience, the School has developed a small eLearning unit with a 50% coordinator and financial means to support internal projects; the budget for 2004 is about SFr. 500,000.-. (http://www.zhwin.ch/studium/e-learning.php) The unit is directly attached to the rectorate (Prorektor Generalsekretär) and thus occupies a central position in the organization of the School. The following main activities are being planned:

newMine

- diffusion of information on eLearning (elearningNews);
- training of teachers and a cycle of lunchtime presentations on eLearning (eLearningForum);
- support to teachers in the realization of eLearning projects.

An issue of the ZHWinfo bulletin was devoted to eLearning: it shows that although a large number of projects are adopting eLearning in the school (for a list see http://elearning.zhwin.ch/units/), there seems to be little central coordination at the moment.

The Pädagogische Hochschule Zürich has a relatively large eLearning unit with six staff (460% person-equivalent), directly attached to the Prorectorat Forschung und Innovation. Thus the impulse for the development of eLearning seems to come directly from the school management, ready to invest in this domain (http://www.phzh.ch/default.asp?navigationID=23). Main activities are:
- the development of concepts and models for eLearning from a pedagogical point of view;
- the support to internal eLearning projects proposed by professors in the school and selected by an internal committee; a first series of projects are already advanced, and other projects are in the development phase;
- training of teachers: the PHZH is a partner in the eLearning certificate programme of the University of Zurich and of the ETHZ;
- the PHZH is also promoting a working group on the use of eLearning in the Swiss teacher training schools;
- finally, the set-up and development of the open-source platform ILIAS (http://www.ilias.uni-koeln.de/ios/index.html); besides the internal use to the school, the PHZH has the ambitious objective to contribute to the development of ILIAS towards an European standard platform; the next ILIAS congress will take place in Zurich in September 2004.

At the Hochschule für Angewandte Psychologie, eLearning activities have been promoted mostly by the activities of Daniel Süess, but are also spreading to other courses. The HAP is now offering access to BSCW for collaborative activities (http://www.hapzh.ch/bscw/index.html); the school is negotiating an agreement with the ETHZ to use their BSCW server instead of installing an own server.

Some activities are present also in the other ZFH schools. For instance, the Zürcher Hochschule Wädenswil is leading two SVC projects in the area of biotechnology (Biotechlab: www.biotech-lab.net) and facility management (Oekotrophology: http://svc.hswzfh.ch). Individual projects are also present in the other schools.

2.3.5.3 Future prospects

In general, because of its decentralized organization, it is very difficult to develop an overall strategy for eLearning for the entire UAS. In the partner schools, too, the situation is very diverse: ZHW and PHZH have developed a more or less clear concept with a central unit for eLearning and explicit support from the school management (including financial means from the school budget), while in the other schools activities are still promoted by the individual initiative of teachers.
At the end of 2003, a working group was created with representatives of each partner school to develop a common strategy and a concept for the eLearning competence centre of the school. This issue seems to have raised heated discussions among the partner schools.
The final concept proposed to OPET provides for a network structure with a central coordinator and three sub-units in each of the three schools planned by the reorganization of the ZFH, i.e. technology (ZHW), design (Hochschule für Gestaltung und Kunst HGKZ) and pedagogy (PHZH). This concept tries to integrate the existing activities and schools, instead of concentrating all the support in one single school. The decision to appoint in the eLearning group of KFH someone from outside the two main eLearning teams in the ZFH is also a sign of this political choice.
However, the implementation of the concept might be difficult since, in the absence of a central administrative structure for the whole of ZFH, there is no logical place where the coordinator could

be located; the Office for University affairs of Canton Zurich is seen as a possible solution until the reorganization of the ZFH has been completed. Moreover, it seems that the viability of the proposed concept will depend largely on the ability of the coordinator to create synergies between the existing centres and to avoid that the centre breaks up into more or less independent activities.

2.3.5.4 Comments

Our interviews show some quite interesting development in eLearning at the ZFH and, especially, the creation in two of the partner schools (ZHW; PHZH) of a support centre located next to the school's headship. However, many of these activities are largely at the experimental stage. Besides some ideas on how to use eLearning, there is a general shortage of strategic solutions on how these tools could be integrated in the future scenarios for the school.

The institutional fragmentation of the ZFH seems to be a crucial problem for eLearning. The lack of central structures makes the development of a strategy at the level of the whole UAS very difficult, while individual initiatives of the individual schools are potentially too fragmented to achieve a sufficient critical mass.

The concept of a network competence centre is probably the only possibility in this situation in order also to achieve a distribution of eLearning to all schools and to avoid political and acceptance problems. However, this concept requires a relatively high level of investment, if units with a minimum of critical mass are to be created. Moreover, even in this model, some common guidelines should be approved; in particular, at the technical level, the diversity of the tools (and especially of the maintained LMS) should be kept to a minimum.

Since the concept entails significant risks of fragmentation, a regular monitoring of its functioning and results should be assured.

Finally, the cooperation with the University of Zurich and with the ETHZ should be discussed more thoroughly. The interviews show that there are a good number of co-operations at the individual level, like the participation of the PHZH in the eLearning certificate and the future use by the HAP of the BSCW server of the ETHZ. At the same time, it was observed that co-operation is more difficult at the institutional level since there is no general co-operation agreement between the institutions.

While this situation depends on the general political situation, we think that in the development of an eLearning strategy and in the design of the competence centre these cooperation opportunities should be better integrated and the option of buying services seriously considered, given the limitation in the available resources.

2.3.6 Haute Ecole Spécialisée de la Suisse Occidentale (HES-SO)

2.3.6.1 General Information on the school

The HES-SO is the result of the grouping of 16 existing schools in seven French-speaking cantons of Switzerland (Bern, Geneva, Vaud, Valais, Fribourg, Neuchâtel and Jura), covering a large geographical region from Canton Valais in the South until Jura in the North-West of the country. It is based on a cantonal agreement and led by a strategic committee; there are no central structures, except for a small secretariat located in Délémont.

The extremely decentralized structure (both geographically and organizationally) and the absence of a central structure are serious constraining factors also for the development of eLearning.

2.3.6.2 Existing eLearning activities and centres

According to our interviews and to materials available on the web, in the HES-SO, besides some isolated experiences, there are three main groups who in the last few years have developed elearning applications and concepts.

At the Haute Ecole Valaisanne in Sierre an elearning platform was developed in the last years by the Institute of Management Informatics (http://ii.hevs.ch/f/default.asp) together with the ICARE services company (www.icare.ch).

I-learn is a simple eLearning platform designed to support presence courses (http://i-learn.hevs.ch/); it has been in use at the HEV for four years and about one-fourth of the professors of the schools make some use of it (at very different use levels). Professors use it autonomously; some information and training workshops having been organized in the past. Moreover, the school is financing the development of an on-line bookkeeping course to allow students to reach the entry level for regular curricula.

At the Ecole d'Ingénieurs de Fribourg, the telecommunication group has been for about ten years working on eLearning applications for courses in the telecommunication domain; this group participated in projects like Classroom 2000, as well as in the SVC project VITELS (Virtual Internet and Telecommunications Laboratory of Switzerland). In the framework of the Creatools program, this group also developed a hybrid course on Voice over IP and Multimedia (http://www.eif.ch/~delley/francais/didacticiels/didacticiels.html), which is used both for diploma education at the EIF and for postgraduate education in the framework of Eduswiss. Moreover, EIF is a CISCO regional Networking Academy and thus organizes courses preparing for CISCO certificates in telecommunications (CCNA and CCSP); the theory part of these courses is delivered via Internet (see http://www.eif.ch/cna/en/demo/index.html).

Finally, at the Engineering School of Canton Vaud (Ecole d'ingénieurs du Canton de Vaud) an eLearning platform has been developed since the end of the 1990s, thanks to funding from a CTI projects. This development has led to the creation of the spin-off company e-Teach (www.e-teach.ch) offering services in the eLearning domain. The platform e-teachServer® is used at the HEV to deliver on-line materials for some courses (see http://www.eivd.ch/php/at_cours.php).

2.3.6.3 Future prospects

Recently, the school direction stated that in four years 20% of the courses in the HES-SO should be supported by eLearning. Also, the project for a support centre (CYBERLEARN) has been approved in spring 2004. The concept provides for a network structure based on a standing committee with representatives of each partner school. The first task of the committee will be to assess the situation in the HES-SO and to identify best practices which could be circulated throughout the school. Moreover, the committee will try to federate the existing initiatives in the school towards a common concept and strategy.

The general idea is thus not to create a physical centre with resident staff, but rather to rely on the work of members of the committee, as well as on projects and specific mandates. More precisely, the following activities are being planned:

- the support to small-scale eLearning projects (SFr. 10-15,000) through an internal call for projects;
- the acquisition of licenses of software tools needed for eLearning for all the schools;
- training activities for teachers;
- specific mandates on pedagogical approaches, economy of elearning, technology.

The total budget should be about SFr. 300,000 financed partially by the school and by OPET. However, it is for the moment difficult to foresee the future development of the centre, since its activities will start in October 2004 only.

2.3.6.4 Comments

Despite the experiences here described, the level of development of eLearning at the HES-SO seems to be lower than in other UAS. For instance, the HES-SO did not coordinate any SVC projects and, in the consolidation phase, acts as a partner in two projects, but with a very small amount. The main exceptions are the groups in Haute Ecole Valaisanne and at the EIF in Fribourg. The last one participated in elearning projects in different programmes over many years, but its activities are limited to a very specific domain.

The dispersion of forces and competences and the scarce engagement of the headships of the participating schools seem to be the major reasons for this situation.

The creation of a competence centre at the level of the UAS seems to be an almost impossible task to solve, given the geographical situation of the school and the limited level of resources (starting with an already low level of development); while trying to federate the different initiatives, the concepts proposed risk ending up being dispersed further and thus will not reach the critical mass needed for an active promotion of elearning.

In fact, the HES-SO is one of the most clear examples of an unrealistic strategy for creating a competence centre for each UAS so that the development of regional structures, in cooperation with the universities, seems to be the only viable solution. We will come back on this issue in the last chapter of the report.

2.3.7 Scuola Universitaria Professionale della Svizzera italiana (SUPSI)

2.3.7.1 General information on the school

With about 900 students, SUPSI is the smallest of the Swiss UAS; moreover, it is the only school where the language of tuition is Italian. According to the 2002 Peer Review, SUPSI is the UAS which has advanced furthest in the reorganization process, having not only a clear strategic orientation overall but also well-defined central structures (school council; board, central services). SUPSI is currently undergoing a process of further reorganization: the existing five departments and three institutes have been merged in three larger departments (innovative technologies; environment, construction and design; economics and social sciences), which are being internally reshaped into institutes. The management is comprises the director general and the three department directors.

The official policy of Canton Ticino provides for a closed cooperation between the SUPSI and the Università della Svizzera italiana, which means sharing of common services (Research Service, eLab, sport service) and institutes (the Istituto dalle Molle sull'Intelligenza Artificiale IDSIA is a joint institute financed by both institutions), as well as the provision of joint curricula in the executive-master domain and a large number of cooperative research projects.

2.3.7.2 Existing eLearning activities and centres

SUPSI has been the first UAS in Switzerland to create a support unit for the whole institution, with the creation in 2001 of the Servizio Didattica Nuovi Media. The service is directed by Federico Flückiger and has concentrated on the following activities:

- organization of training courses for SUPSI teachers on the use of eLearning (especially on technological competences);
- installation and management of the two LMS WebCT and Blackboard, which are used for SUPSI projects, but also for all projects and courses at the Università della Svizzera italiana;
- participation to Swiss Virtual Campus projects as leading house (MACS project) or as partner (see http://virtualcampus.supsi.ch for an overview).

Close cooperation exists since the beginning with the NewMedia in Education Laboratory of the Università della Svizzera italiana (www.newmine.org), especially on organizational and pedagogical matters,

The SUPSI has been leading house of the SVC project 'Master in Advanced Computer Science' (MACS), which has developed and implemented on-line courses for postgraduate education on Java and data mining. This experience has demonstrated the feasibility of supplying courses with a large distance education component in postgraduate education at costs that are comparable with presence courses.

2.3.7.3 Future prospects

Two major events have recently characterized the development of eLearning at the SUPSI, i.e. the creation of a joint eLearning support centre for SUPSI and USI and the integration of the Fernfachhochschule Brig with SUPSI.

1) The eLab USI/SUPSI (http://www.elearninglab.org/) was created in autumn 2003 as a joint service of the two institutions, based on the existing competences of the *Servizio Didattica dei Nuovi Media* on the one hand and of the NewMinE Lab on the other. It is directed by Lorenzo Cantoni and Federico Flückiger. It is financed by the two institutions and through the contributions of the Swiss Virtual Campus. The eLab currently employs about ten people, including project managers, specialists in educational planning, design and technical support.
The eLlab is developing the following main activities:
- support and consultancy to teachers in the introduction of elearning and in the use of software tools;
- installation and maintenance of elearning tools;
- organization of training courses;
- preparation, management and support to existing and new Swiss Virtual Campus projects.
Recently the open source platform moodle (http://moodle.org) has been installed as an entry level for eLearning courses (http://corsi.elearninglab.org); this platform will be distributed as a standard support tool for organizing and managing presence courses at USI and SUPSI. The technological scenario envisages the use of the national WebCT Vista server for more complex eLearning projects and of moodle for simpler activities.

2) Through an agreement signed at the end of 2003, the Fernfachhochschule Schweiz (FFHS) has been affiliated to SUPSI and works as a department of the SUPSI (http://www.fernfachhochschule.ch). The FFHS offers basic UAS curricula with about 75% of activities at distance and 25% presence activities in one of its regional centres (in Zurich, Bern, Basel und Brig). In summer 2004, 87 modules were running on the net. The technical support has been outsourced to spin-off company Brain-tec (http://www2.brain-tec.ch), which also supports the Studienzentrum Brig of the Fernuniversität Hagen.

Since 2001, the FFHS has worked with the eLearning LMS LUVIT. This is a Swedish product of the University of Lund. All teachers and students are registered and use it as an information management system.
An important element of the activities in eLearning is the training of the teaching staff. Therefore a concept called "Leitpapier für die dezentrale Kollaboration, dezentrale Administration und Erstellung von Referenzmodulen in der Lernplattform LUVIT" was developed. At the moment two-thirds of the teaching staff is trained with the concept and a lot of modules are being developed. Nearly 20% of the teaching staff has also worked through a certificate in eLearning-Didactics. Together with Brain-tec, the FFHS develops projects in the area of course production and training.
The integration agreement with SUPSI stipulates a close cooperation in the domain of electronic media and for the delivery of on-line courses.

2.3.7.4 Comments

The SUPSI has excellent qualifications for a wide introduction of eLearning, mostly on account of existing competences and of its cooperation with the Università della Svizzera italiana; the eLab has all the necessary resources (technical, pedagogical, organizational), as well as the critical mass to achieve this task.
However, the use of eLearning has to be spread more systematically in educational activities, since at the moment there are only a number of dispersed projects. Moreover, adoption of eLearning has yet to be coordinated with the reorganization of the study curricula.

A second priority domain concerns the integration of FFHS and, most of all, the exploitation of its potential to deliver SUPSI courses to a wider audience, a task which is critical since the regional market is rather limited.

2.4 Conclusions and overall assessment

Our summary of the present situation in the Swiss UAS may be organised as follows:
- the existing activities and experiences;
- strategies and support from UAS management boards;
- the situation concerning the development of competence centres.

2.4.1 Existing activities and experiences

In our visits to Swiss UAS we found many groups active in eLearning and with interesting concepts. Examples include the Department of economics of the FHBB, the Aargauer Fachhochschule, the Zürcher Hochschule Winthertur, the Ecole d'Ingénieurs de Fribourg. Some of these groups have a long experience in the domain.

However, most of the experiences seem to be limited to a single department or even a curriculum inside the UAS. The level of development is also quite variable according to the UAS considered: the most advanced seem to be at the moment the FHNW (where each school has its own eLearning group) and the ZFH (where two schools have their support unit). Conditions for widespread development of eLearning are also favourable at SUPSI and at the FHZ, where a central unit in the UAS has been created.

Most eLearning experiences concern support for classroom lectures; only in very few cases have blended learning approaches been developed (for example for Berufsbegleitende curricula) or new pedagogical concepts have been tested,(for example project-oriented learning).

Thus, we cannot speak in the present situation of a wide dissemination of eLearning in Swiss UAS, but rather of scattered experiences, in many cases driven by a small group or a single person, who are trying to get recognition from department and UAS management board. Most of these initiatives are quite small in size.

Compared to universities, UAS seems to be lagging behind in terms of both the extent of the eLearning applications and of the available resources (though there are large differences between individual universities; Lepori and Succi 2003). This gap is likely to widen in the next few years since the consolidation programme of the Swiss Virtual Campus provides for much larger resources for universities than for UAS.

2.4.2 Strategies and support from UAS management

With a few exceptions (SUPSI, FHZ), there is a notable lack of involvement of UAS management boards in eLearning development strategies. This situation may be explained mostly by structural reasons. Management boards are relatively weak in many UAS, which have no central administration likely to develop eLearning planning and no central support. Moreover, most UAS are still undergoing an internal reorganization, involving both departments and curricula, and thus there are more urgent problems than eLearning. Moreover, we feel that, except in few cases, there is no recognition of the strategic role that eLearning could play for the future development of these schools. In some cases, the boards of individual schools seem to be more involved, as the examples of FHBB, ZHW and PHZH show, where the school's headship was ready to support and to generalize eLearning initiatives launched by individual groups. Ironically, this involvement of the partner schools makes the development of a strategy at the level of the UAS more difficult.

Thus, the choice of the correct institutional level for eLearning planning seems to be an open issue: in some UAS, an overall strategy for the whole UAS seems to be possible (especially for the most centralized schools like FHZ or SUPSI), while in other cases the only viable option could be to develop individual strategies at the level of departments and/or individual schools (like for HES-SO or

FHNW). However, this entails the risk of further dispersing competences and resources which are already under the critical mass needed to achieve development of elearning.

2.4.3 Competence centres development

Only in two cases (SUPSI and FHZ) did we manage to find at the level of the whole UAS a clearly defined competence centre being able to cover the whole school and enjoying the full support of the school board. In the other cases, the decentralized nature of the UAS and, in some cases (Bern, Zurich) the presence of competing teams, has led to the design of network solutions, whose exact organization and functioning are in most cases to be defined more precisely. The lack of a central place (in political or geographical terms) where to locate such a centre has been a major difficulty in this respect.
What is clear, is that the request of OPET to propose a concept for a competence centre has stimulated thinking in each school. Moreover, we do feel that in most schools people responsible for elearning did a clever job in trying to define a viable concept despite the limitations of UAS' organization, available resources and competing interests.
What is striking in this context is the lack of institutional collaboration with universities and FIT (with the exception of SUPSI). In some cases (Basel, Zurich) collaboration exists for operational purposes, but a general framework for collaboration and resources sharing is missing. Duplication of centres and resources is a very apparent phenomenon, also in situations (like Luzern) where size of schools and available resources are limited. Cooperation in eLearning is also very limited between UAS; every school seems to be obliged to develop a centre and a palette of services on its own (for example, concerning LMS), rather than thinking in terms of synergies and sharing of services.
Our conclusion is that, despite the competence and the goodwill of people involved, a rethinking of strategies and organization forms is overdue, if UAS want to keep pace with the development of eLearning and to exploit it for their future development. Before analyzing these issues in more depth, it is however useful to review some experiences and models from other countries.

3 Elearning in UAS: an international comparison

As we explained at the outset, the introduction of eLearning in the Universities of Applied Sciences has hardly been examined in the literature on the subject, which focuses exclusively on the situation in universities. This despite the fact that in countries like Finland, Germany and Switzerland the UAS account for about one-fourth of university students and even for two-thirds of the total number in the Netherlands.

In this chapter, we present the results of the first comparative study on eLearning in UAS in three European countries, as well in Switzerland. The objectives of this comparison are the following:

- to assess differences between countries in the extent of use of eLearning, in the modes of adoption and in the organization forms for support and delivery;
- to understand the influence of the national context on choices concerning eLearning: the governance and structure of the higher education sector, the policy concerning ICT in education, the organization of UAS;
- to identify some examples and best practices which could serve as an inspiring model for the Swiss case.

To begin with, we selected three countries in which the UAS sector is clearly defined and distinguished from the university sector and accounts for a large share of university students (see Figure 5). Through the analysis of official documents and research reports, we produced a short outline of each national higher education sector and a more precise description of the UAS sector. Then, we selected for each country some cases of UAS being particularly active in eLearning, by analysing web sites and consulting experts. These schools were visited by the research team and the person in charge of eLearning was interviewed. The interview focused on the following main subjects: eLearning adoption, objectives and strategies, organization, funding, and future scenarios. Then, a national report was prepared and sent back to our correspondents for further comments and integration.

In this chapter, our presentation is circumscribed to some key features and to the comparative elements; for a full presentation of the national case studies, we refer the reader to the three national reports published together with the general report.

The organization of the chapter follows these arguments closely. Firstly, we present the higher education system and the role of the UAS in the three chosen countries (Germany, Finland, and the Netherlands) and we compare it with the Swiss case. Follows an analysis of the elearning development in UAS in these countries and the identification of similar tendencies, but also of differences between countries. Finally, we draw some lessons which we find useful for the Swiss case. Throughout the chapter, we present in boxes some particularly interesting examples.

3.1 Three national systems compared

The term "binary" emerged in the 1970s to indicate higher-education systems comprising two different types of institutions, namely universities and a type of higher education institutions oriented towards professional training (Huisman and Kaiser 2001). Typical examples at the time were the United Kingdom and, since the beginning of the 1970s, Germany with the creation of the Fachhochschulen.

The distinction between universities and universities of applied sciences is generally characterised by (Teichler 1988):

- the types of programmes and their organization: typically academic vs professional curricula, longer curricula (4-5 years in universities) and shorter one (3 years) in UAS;
- the degrees awarded and in particular the possibility to award a doctorate degree, which is normally limited to universities;
- the distinction in the research function: either UAS don't have a research mandate or their research activity is quantitatively less important and oriented towards applied research;
- access to higher education institutions (frequently, but not always, with different requirements for universities and UAS) and a limited possibility of switching from one school type to the other.

However, in many cases these apparently clear distinctions become blurred and depend very much on the discipline, as well as on the country considered: for instance, the distinction between academic and professional curricula is difficult to establish in domains like informatics and engineering and, even in binary systems, universities might offer professionally-oriented curricula. Then, the dividing line between universities and UAS is to a large extent a matter of policy and organizational features, as well as status and prestige issue (like the right to bear the name of "university") rather than the real activities performed (both in education and research).

In their review of binary systems in Europe, Huisman and Kaiser (2001) distinguish between three basic types of systems:

* countries where the division between universities and universities of applied sciences is almost non existent: typical examples are the UK and Sweden;
* countries where UAS exist as a separate sector, but their functions overlap considerably with those of universities, and cooperation between the two sectors is broad (for example in curricula development): the Netherlands is considered a typical example;
* "new binary systems" where the distinction of functions between the two sectors is clear-cut: Austria and Finland belong to this group. In our view, Switzerland, too, belongs to this category (although some degree of overlapping and cooperation between the two sectors has been observed lately).

However, the situation may change quite significantly over time depending on changes in national higher-education policy. For instance, in the United Kingdom, which was seen as the prototype of a binary system in the 1970s, polytechnics have merged into the university system, thereby acquiring at the right to award doctorates, and thus the system is now considered to be unitary. On the contrary, in Finland and Switzerland it was not until the latter part of the 1990s that an UAS sector was built by reforming existing professional schools.

These remarks are important, since the organization and function of the UAS sector vary quite sensibly from country to country, and these features may have a strong impact on the models of adoption of eLearning. In Figure 5, we present some quantitative data on the size of the sector, while in the following sections we briefly outline their main features and we compare them with Switzerland.

	UAS	Universities	no. of students in UAS (1000)	Share of UAS students*
Finland	29	20	59	29%
Germany	152	92	436	24%
Netherlands	50	14	290	65%
Switzerland	7	12	22	19%

Figure 5. Data on national higher education systems
Source: Huisman & Kaiser 2001; Eurydice; Ministries' websites.

* Over regular students in universities and UAS.

3.1.1 Germany: the social role of UAS

In Germany, Fachhochschulen were created at the beginning of the 1970s as a means to cope with the expansion of the higher-education system and to grant access to tertiary education. In 1998, over 344 higher education institutions, 183 were Fachhochschulen (including 31 Verwaltungs-fachhochschulen), having in total about 450,000 students. With an average of 2,500 students per school,

Fachhochschulen are thus much smaller than universities (BMBF 2003, EURYDICE 2003, KultursMinister Konferenz 2002).

Fachhochschulen offer highly practice-related training for occupations which require the application of scientific findings and methods of artistic ability. Above all, they offer courses in the fields of engineering, economics, social studies, agriculture and design. The study programmes are shorter than in the university sector. Education is based on classroom teaching, but in many cases includes work experience.

At their creation Fachhochschulen had no research function at all, but with the time some activities have been developed. However, the research budget of FH is a mere 5% of the universities' research funding.

Thus, while for their dimension and educational orientation, German FH are similar to Swiss ones, their mandate is more restricted since as a rule it doesn't include research and continuing education, which is mostly carried out by private institutions.

3.1.2   The Netherlands: blurred boundaries

Although it is only since 1986 that Hogescholen have been considered as a part of the higher-education system, the history of many of them dates back to the nineteenth century. Over the last few years, the originally more than 350 institutions in the domain have undergone a process of drastic redistribution and concentration, shifting down to 50 institutions. Some of them are very large and, in fact, larger than most universities: the two largest ones, Fontys and In-Holland, largely exceed 30,000 students (Boezerooy 2003).

There are some clear differences between the two sectors of the Dutch binary system. Three elements stand out: differences in entrance qualifications, the exclusive basic research function of the universities (including the right to award PhD degrees), and variations in the degrees awarded. In some respects there are also similarities: the length of programmes is, for instance, rather similar in both sectors (the standard is still four years). Furthermore, professionally-oriented programmes are offered both by universities and UAS and thus the distinction between academic and professional programmes is reducing. In addition, Hogescholen offer curricula in almost all domains, including social sciences and humanities. Hogescholen graduates can normally continue their studies in universities and with the introduction of the credit system switching from one type of school to the other is becoming easier. Moreover, universities and Hogescholen have developed extensive cooperation forms.

Thus, even if some clear differences still exist, especially concerning the research function, the borders between Hogescholen and universities are increasingly blurred, especially for the largest schools and this might eventually lead to mergers between the two types of schools and to a general restructuring of the system (Huisman and Kaiser 2001).

3.1.3   Finland : training professionals for high-tech

Very much like in Switzerland, in Finland the Polytechnics (AMK-Ammattikorkeakoulu) were created gradually during the 1990s as the result of the reform of the former vocational education institutions at the tertiary level. The main reasons for this reform were to improve the quality of vocational education to provide highly-skilled workforce and to cope with increasing number of university students (OECD 2003). Nowadays, there are 20 universities and 29 polytechnics, with students' numbers ranging from to 1,000 to 8,000.

The universities are run by the state, while UAS are either locally or privately run. In the latter case, local authorities have founded private companies to run a UAS. Because of their regional nature, most of the publicly owned polytechnics are run by municipal federations (Huisman and Kaiser 2001). Polytechnics usually offer education in a number of different fields, and the higher education degrees that students obtain are professional in emphasis: the starting points for the development of these degrees include the requirements and needs of working life and the degrees qualify for different expert functions in working life. The minimum and maximum duration of polytechnic degrees

are mainly three and four years respectively. In addition to offering specific degree programmes, polytechnics are very active in adult education and carry out research and development work that serves polytechnic training and supports working life (Eurydice 2004).

The rationale for setting up the polytechnics is thus rooted in a strategy for technological and economic development through provision of highly-skilled workforce. In the Finnish context, skills in ICT occupy a central place given the orientation of the national economy.

3.2 eLearning: commonalities and differences

Our analysis shows that in all countries considered UAS are engaging in eLearning activities, even if at varying levels from school to school. Moreover, UAS normally share the same support initiatives as universities, for instance the new media in education programme in Germany and support from the SURF foundation in the Netherlands. However, the national context also evinces differences which are outlined in the next sections.

3.2.1 Finland: eLearning through networking

Information society is the key element in the development of the Finnish economy and the country is a market leader in Europe in ICT-manufacturing and in the use of communication technologies (Internet, mobile phones). In education, the government strongly promotes the use of ICT to reach different objectives: granting access to education, improving ICT skills of citizens, improving the quality of education (Ministry of Education 2003). Thus, according to the new development plan for education and research, by 2008 students in polytechnics are expected to be able to get at least 20 online credits through virtual courses. Moreover, virtual education should be strongly developed in the open and adult education domain.

On-line courses are provided by some Finnish Polytechnics. Some examples are the Helia business polytechnic in Helsinki (see http://www.helia.fi/en/studies/onlinelearning/) or the Häme Polytechnic in Hämellinna, which has a large eLearning development centre (http://www.elearningcentre.hamk.fi/english_index.php?kieli=english). However, most eLearning activities are developed through cooperative structures between polytechnics both in the development of courses and in their delivery and exchange. The best-known example is the Finnish Virtual Polytechnic (www.amk.fi; see example 1), but other activities exist, like Tietie (www.helia.fi/tietie/), a cooperation between eleven polytechnics exchanging courses in the information technology domain.

Moreover, the Finnish open polytechnic AVERKO (www.averko.fi) offers on-line courses using WebCT; about 40 courses corresponding to 100 ECTS are now available; the credits gained at AVERKO can then be used to get a normal polytechnic degree at the Central Ostrobothnia Polytecnic. eLearning development is thus strongly linked to the open education concept and to a credit system allowing recognition of courses followed elsewhere.

The number of students in these courses is still very low. For example, in 2001 TIETIE offered 25 courses with 418 students, while the virtual polytechnic offered over 200 courses in 2003, but only 700 students enrolled. Thus, state support promoted the development of eLearning courses, but stronger incentives would be needed to promote participation in these courses (both for students and for their schools).

Example 1. The Finnish Virtual Polytechnic (AMK)

Link: www.amk.fi

Virtual Polytechnic is a co-operation organisation of all the Finnish polytechnics created in 2001; administratively, it is managed by the Polytechnic of Tampere. The Virtual Polytechnic is not an educational institution offering on-line degrees, like the Open Universities, but a cooperative structure among all Finnish Polytechnics. The central unit located in Tampere comprises about

seven people; moreover, every polytechnic has a contact person representing the interface with the AMK.

The main AMK activities are the coordination of the development of eLearning courses and the management of a common production environment for eLearning courses, as well as for their delivery; the portal www.amk.fi was opened in 2002.

The production of courses is mostly financed through the European Social Found and is based on a cooperation agreement between the Polytechnics involved, which rule on copyright and ensures joint use of the developed courses. The courses are produced by groups of teachers coming from different schools; about 30 teams are active at present.

Most courses are available to students enrolled in Polytechnics; they register through the AMK portal, but then their application is transmitted to local coordinators, who verify compliance with the course of study. For degree students attendance to courses is free: their Polytechnic pays a low transfer fee (between 50 and 150 euros for 1 ECTS) to the institutions delivering the course. Some courses are also open: then students are responsible for paying the fee.

The AKM offers more than 200 courses corresponding to 375 ECTS, but the aim is to have 1500 ECTS available by 2006. In 2003, there were about 700 students applying for AMK courses.

3.2.2 The Netherlands: a bottom-up approach

The diffusion of eLearning in the Dutch higher education system follows a bottom-up path, where support and coordination is provided through consortia partially funded by the state (like the SURF foundation and the Dutch Digital University) and implementation is largely decentralized. According to a recent review, the level of ICT-equipment in Dutch higher education institutions is one of the best in the world (Boezerooy 2003) and all universities and 70% of the Hogescholen have implemented an electronic learning environment. However, the use of these environments seems to be mostly for communication and organization of education, rather than as a teaching tool. A central issue in Dutch higher education is the development of a digital portfolio, which would allow students to record the acquired competences and thus to reform the educational system from a curriculum-based to a competence-based approach.

Hogescholen participate in this process cooperating with universities. Some of them possess rather large eLearning competence centres, like Fontys Interactiv (http://www.fontysinteractive.nl/) or CETIS at the Utrecht Hogeschool (http://www.hvu.nl/index.cfm/site/Cetis/pageid/58EF5127-92C4-6C97-A44D8769A29ADCC9/index.cfm). Such centres perform similar functions as many ICT-centres in Swiss universities: development of eLearning materials, training of teachers, advice and consultancy. Their activity is not limited to Hogescholen, but some of them function for other educational levels; for example, Fontys Interactiv is one of the eight national ICT expertise centres for education and training.

At national level, two major initiatives are supporting eLearning development. The SURF foundation (www.surf.nl; see example 2) provides basic ICT services and finances a series of eLearning projects both in universities and in Hogescholen. The Dutch digital university (www.du.nl) is a consortium of three universities, the Dutch Open University and six Hogescholen to develop cooperative projects for eLearning development. Its main activities are the development of eLearning courses and of eLearning environments; it has a quite large budget of 10 million. euros per year, provided by the state and by the participating school themselves.

A decentralized approach, where applications are developed mostly bottom-up and central units provide support and seed money, the link of eLearning with educational reforms and the cooperation between universities and Hogescholen are thus some distinctive elements of the Dutch situation.

Example 2. SURF Foundation

Link: www.surf.nl

The SURF Foundation (SURF) is the Dutch higher education and research partnership organisation for network services and information and communication technology. The mission of SURF is to exploit ICT for higher education. SURF activities are funded by the participating institutions and by the Dutch government (Ministry of Education, Culture and Science and the Ministry of Economic Affairs). In addition to the governmental funding, higher-education institutions have to pay a yearly contribution of 1 Euro per student.

SURF is organized in three domains. SURFnet provides networks services for Dutch higher education, like Switch for Switzerland. SURFservices delivers software licences and services for higher education.

Finally, SURFeducation promotes the introduction of ICT in Dutch higher education, mostly through funding of development projects based on regular calls for proposals (about 5 new projects per year). While most of the projects are in the universities, Hogescholen participate in some of them: recent examples are the NETlab project (development of a remote laboratory in engineering) and the Digital portfolio project.

The funds are allocated in 5 different domains: Competences/Portfolio; Collaborative learning; Interactive teaching materials; LCMS/Communities; New Media.

3.2.3   Germany: pioneering work in a difficult environment

In Germany, development of eLearning was mostly promoted by the New Media in Education Programme of the Federal Ministry for Education and Research, where about 100 projects were funded with a total amount of more than 250 mio. Euros (BMBF 2002, Kleinmann and Wannemacher 2004). One of the flagship projects in the programme was the Virtuelle Fachhochschule project (see example 3). A recent review of support initiatives and eLearning development in German universities shows a large number of initiatives for the development of learning materials, but also that institutional support is not always present and thus that many of these initiatives risk being abandoned when funding runs out (Kleinmann and Wannemacher 2004). Organization reasons (in particular low students' fees) and a traditional academic culture, emphasizing the role of teacher and the direct contact between teachers and students contribute to this situation; moreover, besides seed funding, there is no strong political push towards eLearning like in Finland. Thus, German universities seem to be rather reluctant to introduce eLearning on a large-scale (Lepori, Cantoni and Succi 2003).

Some FH have created their own eLearning and media development centre; this is the case of the FH Köln (Zentrum für Informationstechnologie; http://www.zi.fh-koeln.de), of the Fachhochschule Düsseldorf (Institut für Medien, Kommunikation und Informationstechnologie; http://www.mki.fh-duesseldorf.de/), and of the Fachhochschule München (Abteilung medien+LEHRE; http://www.fh-muenchen.de/ml/). Also, the tele-akademie at FH Furtwangen started in 1994 by delivering online courses via the internet (http://www.tele-ak.fh-furtwangen.de/portal/content/index_ger.html).

However, the two most significant examples of eLearning in the FH, delivering an online Fachhochschulen distance degree (Fernstudienangebote in der Bundesrepublik Deutschland www.zfh.de/fernstudium/andereangebote/staatfh.pdf), are the Virtuelle Fachhochschule (VFH; www.oncampus.de; see example 3) and the Zentralstelle für Fernstudien an Fachhochschulen (ZFH; www.zfh.de).

The ZFH is a centre for distance education established in 1995 by the Länder Rheinland-Pfalz, Saarland and Hessen, and located in Koblenz. The centre supports the development of online degrees by the 13 FH in the region, providing infrastructure, technical, and administrative support. The development of curricula and their management are performed by the partner FH, where also the students must enrol.

These initiatives are largely motivated by a social objective, that of making curricula accessible also to students who cannot attend higher education institutions regularly. This rationale, for example, was at the basis of the creation of the FernUniversität Hagen (http://www.fernuni-hagen.de/) and some distance education opportunities in the UAS sector. However, in a situation where student fees are very low and FH don't receive additional funding for new curricula, the economic basis for these projects is quite weak. Thus, both cultural and structural reasons seem to hamper the development of eLearning in German FH somewhat.

Example 3. The Virtual Fachhochschule

Link: www.oncampus.de

The Virtual Fachhochschule (www.oncampus.de) is one of the flagship projects financed since the 1998 by BMBF aimed at developing new strategies for teaching and learning and at enhancing classroom lessons (Bischoff & Granow 2002). After the end of federal funding, a cooperation agreement was signed by seven FH to maintain and to deliver the developed curricula. It is coordinated by the Fachhochschule Lübeck.

The VFH developed two full degree programmes in Media and Computing and in Business Engineering; it is now entering the sixth semester of life, involving almost 700 participants. While students are enrolled in one of the partner UAS, the VFH is gradually moving over to the model of a "virtual" UAS, where each programme is managed by a faculty council (composed of representatives of the partner schools) and a virtual university board is in charge of the overall steering and coordination. Thus, one of the most interesting aspects of the initiative is the institutional model created ad hoc in which existing institutions cooperate in a virtual organisation exploiting existing channels and synergies.

The VFH has received 22.5 million euros from BMBF, which were used to buy hardware and software tools and to develop the online teaching materials. Today, the largest costs are the maintenance of course materials (25% of the creation price) and the licenses for the Blackboard platform (50.000 euros per year). The consortium is funded at 50% by its partner institutions, offering in return two degree programmes in which new students are enrolled; for the other 50% it is financed by additional funds from special projects. A clearing system has been negotiated between the partners to account for different services exchanged between them (tutoring, technical services, administration, etc.).

3.3 Lessons to be learned

The national case studies and the examples presented here lead to some reflections which could be useful for eLearning development in the Swiss UAS.

1) Firstly, our case studies show the influence of the structure of higher education and of policy objectives on eLearning development. Thus, the Finnish government could force Polytechnics to introduce eLearning in their education by fixing a mandatory target, a mechanism which would be impossible to set up in more decentralized systems like the Netherlands or Switzerland. Also, the situation of some Dutch Hogescholen, where student numbers exceed that of the whole FH sector in Switzerland, is completely different from the small institutions in Switzerland, Finland and Germany. The academic culture of Germany contrasts with the more technologically oriented culture of Finland and lowers significantly the acceptance of eLearning. Thus, before imitating overseas models, one needs to check if the conditions for their functioning are present also in Switzerland.

2) However, all countries considered share an important feature: higher education is considered as a public good and, in fact, extending the access to it is a major objective of higher education policy (both for social and economic reasons). As a consequence, tuition fees are very low (or non-existent in Finland) and there is little room to increase them even if educational quality and services are improved. This is a different situation than in the United States, where market competition is the main governance mechanism of higher education (Clark 1983) and, thus, offering a better (or more fashionable) product may attract more students and thus allow increasing the tuition fees.

As we discussed in a previous paper (Lepori and Succi 2004a), this has a far-reaching consequence for eLearning. In most cases, for European higher-education institutions the opportunities to get additional funding from tuition fees of students attracted by eLearning courses are very limited; the Finnish and the German examples show that in most cases these courses bring additional costs (even in the delivery phase), but very little revenue.

This means that a strong political push is needed to develop eLearning rapidly: this is exactly the case of Finland, in the context of a society where information technologies have become the main motor of development. In public-oriented higher education systems, the policy rationale for introducing eLearning needs then to be clearly identified, since market forces are too weak to ensure alone its diffusion.

3) An implication of the previous discussion is that eLearning applications in Europe tend to be low cost and, even in this case, government seed money is necessary to develop eLearning courses. In fact, compared to some sophisticated solutions developed in the Swiss Virtual Campus programme, most of the on-line courses we have seen are quite simple and cheap. For example, the Virtuelle Fachhochschule estimated a cost of production of about 50,000 euros per course. Simple applications are also a condition for sustainability, since maintenance costs are typically a fixed percentage (25% at the VFH) of the original production costs.

Moreover, almost all courses were developed in the framework of publicly funded programmes, like new media in education in Germany, projects of the SURF foundation in the Netherlands or the European Social Fund in Finland. In the European context, the set-up of a permanent funding instrument for course development is probably necessary if one wants them to go on being simple support tools for presence education. A realistic economic calculation, taking into account the European situation and affordable costs, is thus needed to ensure the viability of eLearning applications.

5) Collaboration between different institutions is present in all three countries considered, not only in the production of courses but also in their delivery. The reason is that, with the exception of the largest Hogescholen in the Netherlands, all other UAS systems face the same problems of critical mass we encountered in Swiss UAS. Moreover, if the number of students for a course is sufficient on a single UAS site, there is limited interest for eLearning, except as a support for presence education. For the Swiss situation, the Finnish model of building a network of Polytechnics exchanging their courses and where students can freely circulate (at least virtually) seems to be quite interesting, if maybe a little provocative.

6) Finally, cases like the Virtuelle Fachhochscule or the Virtual Polytechnic emphasize the need for institution building. Joint provision of courses requires the creation of decision-making structures, like steering boards or the virtual faculties of the Virtuelle Fachhochschule, and the set-up of clearing agreements, to compensate for costs and revenues, as well as of agreements on ownership of course materials. Also, from our site visits, it emerged that the set-up of these infrastructures requires significant time and engagement and is essential for the success of cooperation.

4 Developing an eLearning strategy for UAS

In this chapter, we propose some measures to exploit the potential of eLearning for the future development of Swiss UAS.

Our aim is not to dictate a strategy or a course of action which should be followed by every Swiss UAS, but to elucidate the different alternatives and opportunities concerning eLearning and to relate them to the future development of the Swiss higher-education system and to the position of the UAS. We are thus convinced that every UAS, as well as every department, should confront itself explicitly with the issue of integrating eLearning in its educational activity. Promoting this consciousness and indicating some ways to do it is the main aim of this chapter.

The chapter is organized as follows. Firstly, we sum up the present situation and we identify strengths and weaknesses of eLearning in UAS. Then, we focus on three main components of an eLearning strategy:

- the definition of strategic objectives and their integration in the overall planning of the school;
- the integration between eLearning and educational planning and the design of suitable educational scenarios;
- the creation of the support structures to implement the strategy and the need for a national planning of support centres.

Finally, we deal with the development of interschool collaboration and of national coordination and support activities as a key issue for eLearning development.

In this chapter, we focus on the specific issues concerning the Swiss UAS; we thus limit the discussion of the general issues concerning eLearning strategies in higher education to what is needed to achieve them.

To the reader interested in a wider presentation of the subject, we recommend the preceding EDUM report on eLearning in Swiss universities (including comparative aspects; Lepori and Succi 2003), as well as the excellent reader on national eLearning strategies prepared by Tony Bates for the UNESCO (Bates 2001). It is also worth consulting the recent volume edited by Dieter Euler and Sabine Seufert on eLearning in Higher education and educational centres, containing contributions by most of the Swiss specialists in the domain (Euler and Seufer 2004).

At the European level, the Association of European Universities published some years ago some guidelines on the subject (Association of European Universities 1998). Useful reading is also the HECTIC report on "European Union Policies and Strategic Change for eLearning in Universities", promoted by the so-called COIMBRA group (Coimbra Group 2002; http://www.coimbra-group.be). This group of European universities has a specific task force on eLearning and produces regular reports and documents on the subject; it is also involved in many European projects concerning monitoring and promoting eLearning in universities. While these documents refer directly to universities only, most of their contents can be readily applied to UAS also.

4.1 An encouraging, but fragile development

The state of development of eLearning in Swiss UAS may be summarised as follows (see ch. 2).

On the positive side, there are a number of competent people and groups in the different schools; these people generally have a vision on how to develop eLearning and indeed expressed it during the interviews we carried out. Moreover, proportionately to the size of the schools, investment in eLearning is significant, even if there are sensible differences between the individual UAS. National support programmes like Swiss Virtual Campus or Creatools played a key role in this development, since most of the existing activities were born out of these projects; also, the call by OPET to design a strategy for a support centre at the UAS level promoted for the first time a reflection on how to organize and to integrate eLearning activities in each UAS.

However, moving on to the weak points, we think that these competences are too dispersed to reach a critical mass allowing to maintain the necessary infrastructure and to promote eLearning in

departments. Moreover, these competences are largely the product of the pioneering work of one or two people, hence somewhat fragile. Also, support from the management of the UAS is in many cases feeble or lacking. Finally, with a few exceptions, eLearning is not well integrated in educational planning, even if people in the eLearning domain are aware of this need.

This situation should be compared to that of Swiss universities, where there are now signs of consolidation of eLearning into more stable and larger structures; namely, in about half the Swiss universities it is possible to identify a support centre at the level of the university. In other cases, specialized units exist, for instance in Bern (Abteilung für Unterrichtsmedien in the Faculty of Medicine) or in Geneva (TECFA in the Faculty of Psychology and Education Sciences). Also, the selection of the new SVC projects for universities points to increasing concentration, since three universities (Zurich, Lugano, and Basel) were assigned most of the projects.

Thus, we think that despite their engagement, given the limited and dispersed resources available, there is a risk that some UAS choose low-level solutions, which don't produce visible results. This could create a vicious circle, where the lack of results excludes political support (both at the national and at level of the school's management boards) and thus additional resources.

4.1.1 Structural contraints

Our visits showed that some structural characteristics of Swiss UAS have an important impact on eLearning strategies and, actually, force UAS to choose different paths from the universities'.

A first feature is that UAS are smaller than universities; the largest UAS (the ZFH) has fewer students than most Swiss universities, and the average number of students is about half the average of cantonal universities and FIT. What is more important, UAS are geographically much more decentralized than universities; while all universities are organized in departments according to the main discipline groups, most UAS are still organized on the basis of individual establishments, with different locations and in many cases offering similar curricula. As a consequence, students' numbers for each curriculum are generally lower than for universities and, in fact, reaching a critical number of students is crucial for UAS curricula. Finally, the portfolio of activities of UAS is different from that of universities: research activities are less significant, despite the recent efforts to develop applied research, but UAS are much more active in designing curricula for working people and in continuing education than universities.

This has far-reaching consequences for eLearning. Firstly, in most cases UAS are simply too small to develop eLearning alone and thus cooperation has to be developed much further than today. Secondly, in most UAS there is no central place where to locate (both organizationally and geographically) a support centre for eLearning; thus, as we will discuss later, the strategy for support needs to be fundamentally redesigned. Finally, educational needs are different: support to students in courses with large number of students is less important than in universities and thus it is less interesting to adopt eLearning for this purpose. On the contrary, developing curricula that are more suitable for people unable to attend classes every day is much more interesting for UAS than for universities.

The above remarks show that simple imitation of university strategies will yield no good results. On the contrary, UAS need to develop their own strategies, building on their own strengths and specificities (for example, in continuing education).

4.2 Developing an eLearning strategy

Our analysis shows that, with a few exceptions, the UAS management boards have yet to recognize that eLearning is not an additional cost or difficulty, but bears a potential for the development of their school. Moreover, eLearning is not a specialist issue, but impacts directly on the core business of educational institutions, namely transmitting competences and abilities to students.

We think that this attitude is wrong. It is easy to foresee that, in a few years' time, information and communication technologies will have become widespread in higher education. Even if the most dramatic scenarios, like the disappearance of the campus student, are unlikely, the way of teaching and

learning could change significantly; and it is by no means sure that in one or two decades most curricula will still be structured in classes through the day, five days a week. Moreover, most studies agree that these changes will also modify the status and position of higher-education institutions: institutions able to benefit from the opportunities of eLearning might gain some competitive advantage.

4.2.1 Changes and opportunities

There are some important changes anticipated for the next few years in the higher-education market which are of relevance for eLearning.

Among the general trends, at the international level, there is increasing demand for higher education, leading to a general increase of registrations, but also changes in the needs and composition of the student body: educational demand will increase essentially for continuing education and retraining (including postgraduate studies), as well as for students in employment or married with family, while the market of traditional students on campus is more likely to stagnate (for a review and short summaries of the main studies see De Boer et al. 2002). Moreover, all studies predict increasing competition in higher education, nationally but also internationally: in some domains, like management, American universities are entering the international market through on-line curricula, while the Bologna reform and recognition of curricula will favour student mobility especially at the master level. Thus, the model of the student spending his course of study entirely in a single higher-education institution could be, at least partially, replaced by a more open education concept, where credits can be acquired in different institutions. Finally, limitations of public budgets will put pressure on higher education to reduce unitary costs and to apply to different sources of revenues.

A likely consequence of these trends will be differentiation of institutions and of educational programmes: the old organization on a geographical basis is being at least partially replaced by a more open market, where students are more mobile and choose between different educational offers according to their needs, interests and, maybe, fashions.

In this context, UAS in the next years will have to address a series of specific issues. These include the need to reduce costs and to concentrate curricula to achieve a minimum number of students, the introduction of the Bologna reform and the implementation of graduate curricula (in universities and, possibly, in UAS) and, finally, the issue of complementarities with universities, especially concerning graduate and continuing education, in a situation where the traditional delimitation between academic education and professional education will become less clear-cut and where universities may also try enter the professional market.

We will show later that eLearning could be a useful instrument to tackle these issues and to strengthen the position of UAS in Swiss higher education.

4.2.2 Steps to be taken

Thus, we propose that each UAS develops in the next few years a strategy concerning eLearning. The main question this strategy should answer is the function of eLearning in the future development of the school: will it be used for improving and modernizing learning of campus students, where the UAS already has enough large numbers and a specific niche? Or will eLearning allow expansion into new markets, for example enlarging the geographical scope of continuing education? Or will it be a tool for exchanging courses and developing joint curricula with other schools? The answers to these questions are related to specific situations, strengths, and problems of each UAS or, inside each, of each domain or curricula, and will lead to quite different educational and use scenarios. Finally, the strategy will have to indicate the infrastructures and the support needed for these applications, the resources needed and their funding (see Figure 6).

Level	Issues	Actors
Strategic objectives	• Strengths and weaknesses of the school • Contribution of eLearning to the school development • Targets to be achieved	School management boards ELearning officer / commission
Educational scenarios	• Design of curricula integrating eLearning	Departments; teaching services
Support activities	• Infrastructure needed • Support and services	ELearning officer
Resources	• Personnel • Financial resources.	Finance office

Figure 6. Components of an eLearning strategy

The preparation of this strategy and the promotion of eLearning in the school management should be a priority activity for people engaged in eLearning, much more than the organization of support and technical infrastructure. As we will discuss later, in many cases it is preferable to outsource the latter activities and to concentrate on strategy and educational planning.

While this task has to be performed by each UAS individually, national bodies (OPET and KFH eLearning) could give their backing to this process; namely, we suggest that the Confederation explicitly asks UAS to integrate eLearning into their strategic planning delivered to the federal authorities. Moreover, since eLearning competences are unevenly distributed in UAS, coaching and exchange of experiences in the KFH eLearning would be quite useful.

Finally, at a national and political level, promotion and persuasion work is needed to let politicians, administrators and school managements understand the potential of eLearning. Both OPET and KFH eLearning should be more active in presenting experiences and success stories in UAS, especially in the framework of the Swiss Virtual Campus.

4.3 Integrating eLearning in educational planning and development

In this context, we consider eLearning as a set of tools whereby educational activities may be designed differently than in the past: this could mean altering the balance between presence and distance activities, but more importantly modifying the modes of learning and transmission of knowledge. This could facilitate access to or attract new publics, or improve the quality of education for actual students, reinforcing the position of the school on the higher education market. In the rest of this chapter we propose some models and discuss their relevance for Swiss UAS.

This approach implies that eLearning should not be considered as a separate activity, to be delegated to a specialized centre, but as a component of curricula and educational planning; at best, responsibility for eLearning development should be integrated within didactical services or directly within the headship of each department. In other words, each time a curriculum is redesigned the potential of ICT should be considered alongside other aspects like pedagogy, market, infrastructure, organization, etc.

The introduction of the Bologna model is an excellent opportunity, since anyway most of the UAS curricula will have to be redesigned and, in the case of graduate courses, fully new curricula will be developed. However, little has been done until now to realize this integration. We suggest two measures:

- Firstly, each school should appoint an expert in eLearning for the development of Bologna curricula, and address explicitly the use of eLearning for new curricula (especially for graduate studies); indeed, this should be one of the main tasks of eLearning officers;
- Secondly, at national level, documents and guidelines produced by the KFH on Bologna should explicitly consider the potential of eLearning and propose some adoption models; close cooperation between the Bologna group and the eLearning group should be realized.

4.3.1 eLearning as a support to presence education.

With this model, we mean the adoption of eLearning to improve existing educational activities, essentially for campus students (including possibly part-time students). These are mostly simple applications, like putting course materials on a web site or LMS or adopting communication tools like forums; however, these applications in many cases entail a revision of the educational concept of the curriculum (like increasing autonomous study and replacing face-to-face lectures with classroom discussion).

Concerning this scenario, we think that UAS have no choice: in five to ten years, these applications will have become standard in many areas of higher education, as is a beamer and PowerPoint to hold a classroom lecture today. These applications will thus become a necessary asset for the delivery of educational activities, as well as for the reputation of a school. Especially in technological domains, curricula without these supports risk being perceived as old-fashioned and, possibly, of lower quality. However, differences in policy, support and availability of infrastructure will probably lead to large differences between individual higher-education institutions.

The issue is relevant for Swiss UAS, which exactly in these domains are confronted with the competition of Universities and of the Federal Institutes of Technology. Moreover, critical mass is an issue for UAS in most of the curricula and thus attracting new students (or not losing students to competitors) is in many cases a condition for the survival of the curricula. Finally, these applications could help UAS curricula to evolve from a secondary-school model, where students sit the whole day in a classroom, towards a model with greater flexibility and share of autonomous study.

UAS possess all the needed competences and experiences to implement this strategy, which is pursued by most of the persons we interviewed. However, the issue here is how to ensure that these applications spread throughout the curricula and the departments. This requires some normative pressure from the school management, but more importantly two things. Firstly, the availability of infrastructure and services: an-easy to use LMS available to all teachers and students, procedures to manage the accounts and a well-functioning help-desk. Secondly, an information and training campaign for the benefit of teachers through workshops, but especially in-depth and frequent personal contacts to motivate and assist people will be necessary.

We also suggest that, like in Finland, quantitative targets on the percentage of courses supported by eLearning are set and regularly monitored at a national level.

4.3.2 Reach new publics through hybrid curricula

With this model we mean the adoption of eLearning to develop new curricula (or to transform existing ones) to reach new publics, normally by delivering hybrid courses with a substantial reduction of the amount and frequency of presence activities. The distinction with the previous model is a gradual one but what distinguishes this strategy is the idea that, by organizing differently educational activities, it is possible to reach publics other than the normal campus students and/or to deliver educational programmes that are otherwise impossible (for reasons of costs and of student number). These developments are coherent with strategy pursued by some UAS to break into new markets, by developing curricula for working people as well as continuing education courses and curricula. In fact, it is well-know that advantages of hybrid courses are more evident for courses directed to working people or to persons that, because of other engagements, do find it hard to attend school regularly at fixed times. Thus, as is the case in Finland, open education could be a choice domain where to develop this kind of applications.

However, we found in Swiss UAS only very few examples of this kind of application, including some post-diploma studies and continuing education courses. We think that the difficulty is not shortage of educational competences (to design these of educational scenarios) or technological knowledge (to implement them), but rather cultural, institutional and organizational.

In fact, this kind of application requires shifting from the level of the single course to redesigning whole curricula. Instead of approaching individual teachers and explaining then how use an LMS, it is necessary first to convince and motivate the management boards of the departments or, at least, the commissions in charge of designing and managing curricula and to engage in educational and organizational planning (including time schedules, exams, etc.). This process requires greater resources and more time than it takes to implement individual courses. Finally, these activities are feasible only having a support centre of sufficient size, which is not yet the case in most Swiss UAS.

However, although at present UAS should give priority to the spread of eLearning as support to presence courses, it would be wrong to discard too quickly the opportunities discussed here, especially in view of the problems of critical mass which confront UAS in many domains. We thus suggest that each school identifies one or two pilot experiences of hybrid curricula to be developed in the next 2-3 years (possibly in cooperation with other schools).

Opening new markets was also one of the main rationales behind the decision of SUPSI to integrate the Fernfachhochschule Schweiz; since the home market of SUPSI is limited for geographical and linguistic reasons, the FFHS could be an opportunity for delivering at distance the same curricula taught in presence in Ticino and thus to reach a critical mass of students also where numbers in presence are too low to justify curricula. Even if distance education has a limited tradition in Switzerland, the same kind of reflection could apply also to other UAS. Thus we suggest considering cooperation models, where also the other UAS provide competences, content materials and tutoring and the FFHS takes care of the production of curricula and of their delivery via Internet. Suitable cooperation and financial agreement would of course be needed.

4.3.3 Exchanging courses and joint offer of curricula

A third possible scenario for eLearning is the joint provision of curricula and the exchange of courses between different schools. This model is quite popular in other countries, as is the case with the Virtuelle Fachhochschule in Germany or the Virtual Polytechnic in Finland.

The simplest example is the exchange of individual courses through a common portal, like, the Finnish Virtual Polytechnic or, in the university domain, the Intercampus project in Barcelona (http://www.catcampus.org/). The point, of course, is to broaden the range of subjects, especially for specialties and optional courses.

A more complex case is the joint development and offer of curricula between different higher education institutions; this could mean the joint production of the course materials, while each institution enrols and manages its students (Virtuelle Fachhochschule). This model is very close to what was envisaged initially in the Swiss Virtual Campus, but with two important differences: firstly, it is realized at the level of a whole curriculum and, secondly, it is based on an official agreement between the schools, rather than on a cooperation more or less à la carte between individual professors.

Finally, in the Swiss context, distributed curricula where individual modules are offered by different institutions could be an interesting option for domains where there is no sufficient number of students locally. Presence activities could be organized in block seminars in different locations, very much like some doctoral courses or postgraduate diplomas today, while a large part of student activities would be performed on-line. A choice domain of application would be Master studies, where this organization forms could make it easier for UAS to offer a large enough palette of curricula, by simultaneously reaching a sufficient number of students. In this domain, UAS could be confronted to competition from universities, which are entering in the market for executive masters and could in future offer access at some conditions to students with a UAS bachelor to their Bologna masters; in this domain, universities have a clear advantage since most of their students will pass more or less automatically from bachelor to master.

Distributed courses might be an option also inside individual UAS, where concentrating a department or a curriculum in one location is not feasible.

These are only some examples, to demonstrate some of the ways eLearning could contribute to the development of new educational scenarios and the reorganization of curricula.

4.4 Rethinking competence centres strategies

The creation of a support centre for eLearning has been a major concern in recent months, and all UAS succeeded in presenting a concept to OPET. However, we noticed in chapter 2 that the situation is largely unsatisfactory and only in two cases (SUPSI and FHZ) it was possible to identify a centre covering the whole school. While the situation in this respect is not always satisfactory in universities either, since about half of them has yet to find a stable solution, UAS have specific problems due to their smaller size, but most importantly to their decentralized structure.

Thus, we think the "one school - one centre" strategy is not realistic -a scenario with 19 support centres in Swiss higher education (with less than 150.000 students) can hardly be considered sustainable - and that the strategy concerning support centres has to be fundamentally revised. Otherwise, the risk is that only a minority of the UAS find a durable solution, while the others are left without any support structure.

4.4.1 Conflicting needs

The complexity of this issue is largely due to the fact that, in creating support structures, some conflicting requirements have to be satisfied at the same time. These are the need for each UAS to have its own structures for eLearning, the need for a minimal critical mass for a support centre and the importance of proximity for delivering support.

1) As a consequence of the importance of eLearning for higher education, UAS cannot simply delegate their activities in this domain to an external centre or subcontract it to a university. The development of a strategy and of educational applications has to happen at the school level and, in fact, integrated with the planning of educational activities. Thus, each UAS should have an organ in charge of steering and promoting eLearning.

2) Secondly, critical mass is a killer criterion for a support centre. We are of the opinion that a minimum of 4-5 people engaged more or less permanently are required to have sufficient operational capacity - including the ability of taking on new projects - and continuity in case of departures. Today, in the UAS, only the joint support centre in Ticino and the PHZH in Zurich reach this threshold. Where a centre cannot reach this size, either because it is too small or because eLearning is not a priority, cooperation solutions or outsourcing should be preferred.

3) Thirdly, for most support activities, proximity is important, since personal contact is needed for promotion and support. This means that, for support, regional centres are more indicated than centres at the level of the school for UAS which are geographically distributed.
   Moreover, proximity is also important inside the centre, since eLearning requires a close integration between different (organizational, technological, pedagogical) competences. Thus, a support centre should have one location, perhaps providing some external antennas or correspondents to reach different locations (like the solution adopted at the FHZ). Network solutions are good for coordinating, involving, and promoting, but not for support.

4.4.2 A network of support centres

There is no simple solution to reconcile these requirements given the present structure of UAS. This means that different organization forms have to be designed for each school. However, we put forward a general scheme indicating how support could be organized (see Figure 7).
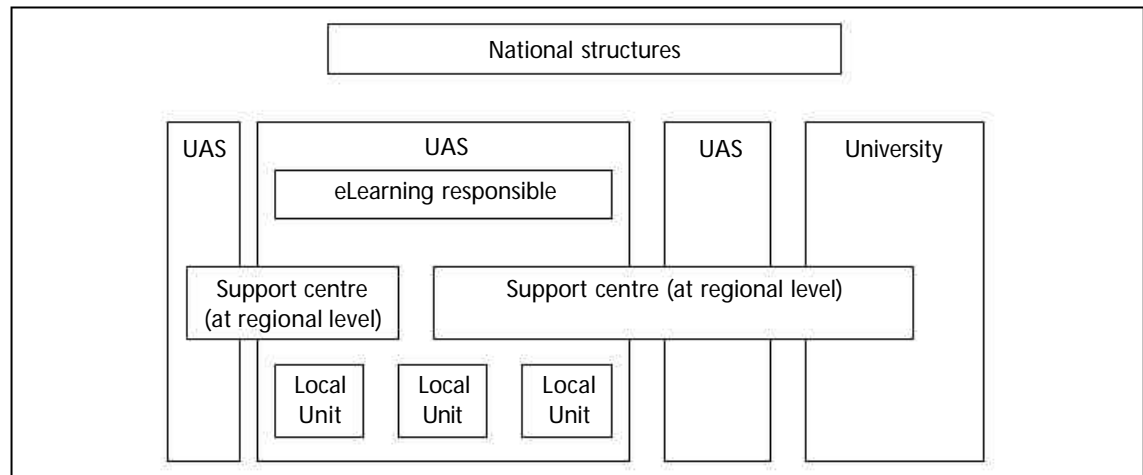
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Figure 7. Support centre strategy: an outline

1) Firstly, the issue of a competence or support centre should be separated from that of an eLearning strategy. While the latter has to be developed in the school, it is possible to outsource the technical and support activities to an external centre, be it a consortium between different schools or simply the support centre of a larger institution. We think that especially the schools with fewer resources would be well advised to concentrate their efforts on strategy development, promotion and involvement of the individual schools rather than on organizing support. This could take the form of the appointment of an officer in charge of eLearning (jointly with other central tasks) or of a special committee with representatives of the individual schools or departments.

2) Secondly, each UAS should organize small units decentralized in every location, with the task of promoting eLearning and advising and supporting teachers, very much like IT support or logistics. With a 20-50% engagement (probably sufficient), the profile would require a person with experience in educational planning, as well as sufficient knowledge of technology to advise the best choice.

3) Thirdly, at a higher level, true support centres would be in charge of producing on-line materials, provide technical support and manage application (for example LMS). Ideally, 5 to 6 support centres in the whole country could be a reasonable number. Thus, we think that in most cases regional solutions have to be sought, as in the case of Ticino, where only thanks to the creation of a joint centre between USI and SUPSI was a critical mass achieved. Regions where this kind of solution is advisable include, to quote but a few examples, Lucerne, Fribourg, Neuchâtel, and Bern.

4) Finally, some tasks and infrastructure should probably be provided at national level, either by national organizations (e.g. Switch for WebCT national server) or delegated as a service function to a support centre.

What emerges from these reflections is that the issue cannot be solved satisfactorily at the level of the individual schools, but requires some national coordination. Elaborating, at least for the UAS domain, a general concept for support structures should be a priority task for the eLearning support group of the KFH.

4.4.3 Reducing technological diversity

eLearning requires a suitable technical infrastructure for the production and the delivery of courses. In particular, its diffusion requires the set-up of at least one Learning Management System available for all teachers in the school.

Moreover, if eLearning has to spread wider than to the few technological freaks, quality of the service and support are essential. Not only has the service to reach quasi-commercial standards of availability (like the web sites of the schools), but also a help-desk has to be guaranteed open to the public during normal office hours and be able to respond at short notice. Tasks like the management of students' accounts or putting in the LMS large quantities of materials should not be left to the teachers alone. At the same time, teachers and students should not be obliged to find out by themselves how to use LMS and how to subscribe to courses. All this requires careful planning, sufficient resources and smart solutions, concerning for example authentication procedures, services which are possible only with support centres with sufficient resources.

However, as a first step, decisions are to be taken as to the tools to be adopted. While for content production or for communication some standards exist, the situation concerning LMS is more fluid. In Swiss UAS, for a number of students comparable to a medium-sized European university, we found a large diversity of solutions, including at least one commercial system (WebCT), three open source LMS (claroline, ilias and moodle), as well as some systems produced in house. We noticed a clear trend away from commercial LMS, perceived as too complex, inflexible and costly, and towards open source solutions.

We think that the situation is unsustainable especially in terms of human resources needed to maintain these applications and to assure support to teachers and students. Also, open source software is no cheap solution, since there is normally no professional support available, and thus it is necessary to have a specialist of the application in-house. Although each LMS has its own advantages, the diversity of the needs doesn't justify such a large palette of solutions: ideally for the whole Swiss higher education system one or two commercial LMS (probably managed at national level) and one or two simpler open source products for support to presence education would be broadly sufficient.

This leads us to two main recommendations.

1) Firstly, there has to be some national coordination of technological choices, leading to the definition of a small number of applications to be used. While ideally this should be done by universities and UAS together, a first step would be to start this reflection inside the KFH eLearning group.

2) Secondly, a goal for each UAS is to provide access to all teachers and students to at least an LMS (preferably a simple open-source solution). In many cases, preference should be given to buying these services from larger centres than trying to provide them internally with insufficient resources and service level.

4.5 Developing institutional cooperation and national coordination

We have already noticed that cooperation between schools is a distinctive feature of eLearning in the three countries we visited. This cooperation is based on two different principles: firstly, it allows reducing the costs of eLearning by sharing resources (for example on-line materials for courses) and technical infrastructure; secondly, it is a prerequisite for the joint offer of curricula and the exchange of courses between schools in different locations. In higher-education systems characterized by relatively small schools (e.g. Finland, Germany, and Switzerland) and with low numbers of students inter-school cooperation appears to be necessary to develop eLearning.

We also notice a fundamental difference between the Swiss situation and that of other countries. In Switzerland, cooperation has been mostly realized through development projects, especially in the Swiss Virtual Campus; this kind of cooperation is transitory, depends essentially on the provision of seed money and doesn't engage the schools themselves. Moreover, it is generally limited to the joint

production of course materials. On the contrary, in other countries cooperation is much more institutionalised, in the form of inter-school agreements (for example for the exchange and recognition of courses) and of joint institutions, like the Finnish Virtual Polytechnic. Cooperation concerns especially the joint delivery or exchange of educational activities and the sharing of resources and technical infrastructures; as we discussed earlier both cooperation forms would also be very helpful in the Swiss case.

More specifically, some domains where institutional agreements are needed to establish cooperation are the following:

- recognition of credits for courses delivered by other schools;
- quality assurance for on-line courses;
- financial agreements for educational activities and services (clearing);
- IPR management and licensing of course materials.

While some of these rules could be established centrally for the whole UAS domain by the federal authorities, we think that the approach based on inter-school agreements (as in Finland for the Virtual Polytechnic) is more suited to the Swiss tradition. However, much stronger incentives at a central level are needed to promote this development. Thus, we think that cooperation and institution-building is an absolute priority for national policy concerning eLearning and, in particular, for the intervention of the KFH and of OPET in this domain.

Moreover, we found that there is a clear need for some national coordination on issues like the introduction of 'Bologna', the development of joint curricula, the establishments of agreements, and the planning of support and infrastructure. Thus, we think that the KFH should much more active in this respect and that the KFH eLearning group should be granted more responsibilities and resources to perform these tasks, moving a step further than its actual organization as a working group delegated by the schools. The Dutch case shows also that there is, in principle, no reason to create separate structures for eLearning for universities and UAS, but that the two can cooperate within the same framework. Given that some issues concerning eLearning, like the joint offer of master courses, technical infrastructure, and support, cannot be solved satisfactorily in the UAS domain alone, cooperation between UAS and universities in this domain should be promoted more actively and, in a longer term perspective, a single institution, such as the SURF foundation in the Netherlands should take care of support and development of eLearning in both domains.

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