AALBORG UNIVERSITY
DENMARK

Pedagogical and Technological Challenges in on/off Campus Education

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PEDAGOGICAL AND TECHNOLOGICAL CHALLENGES IN ON/OFF CAMPUS EDUCATION

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Abstract – Supporting the learning process for off-campus and on-line students is needed to establish a structured and motivated competence development. New pedagogical format – i.e. pedagogical resources, scenarios, composing, activities and technological support - has been developed to strengthen the individual learning process. Experiences from distance education in individual learning are fine since individual learning responsibilities are natural leaving out alternatives learning options. On-campus students did not benefit from the new method and especially the challenges expected to support preparation for the preceding attendance teaching, an understandable fact since the classroom teaching is a high quality of service alternative. Changing the on-campus learning process to be more reflective and using the new format for courses may improve the learning behavior and merge material maintenance and development. This requires new competences in the learning organization, and the problem is if the willingness for changes exists among staff and in the organization as long as competition from the educational market is small.

Index terms—on-campus education, off-campus, course template, course structure, course learning path

1. INTRODUCTION

At the end of the last century, extra attention was made on competences development of employees in industry. The reason was to attract and keep employees and at the same time to increase the potential knowledge inside the plant for competition purposes. The result was making plans for individual competence development also useful to the plant – education became a competition parameter. One more aspect became obvious; the wish to relate the employee's educational activity closely to the working situation, so relation and motivation became important factors. Adapting learning processes to the industry and problem based learning (PBL) became trends in the competence development strategy, and thus focusing on learning methods and learning processes. Changes in competence development were then evident in industry and influenced the educational institutions too. In the didactic triangle as shown in Figure 1, focus was moved from the teacher's corner to the learning part. The major flow of knowledge should now go from the knowledge producer in the top of the triangle to the learner and less via the teacher, who now should have a dominant moderator and facilitator role. Conditions for the learning process are more defined by the learning part (customer, employee, plant etc) then before when it comes to continuous education, but is not the case in the traditional educational schools.

Scientist
(Content)

Learner   **Teacher**
(Learning)   (Teaching, developing
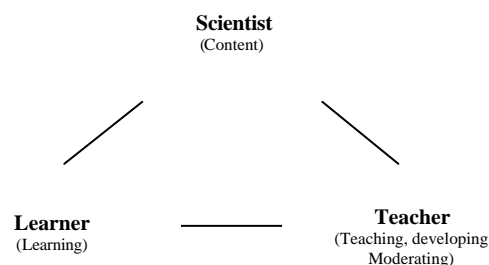Moderating)

Figure 1 The didactic triangle (Erik Laursen, 2003)   (..) are roles

The educational institutions customers are gradually changing to fulfill requests for re- education and continuous learning, based on flexibility in both on-campus and off-campus and on-line education. Off-campus on-line continuous education is setting strong demands for competition skills since the customers are able to choose among numerous operators where content, methods, flexibility and price are important for the selection. As long as the educational institutions still have their major income from on-campus customers, the competition between institutions is minimum and the teacher driven teaching may continue as usual. The demand from customers for off-campus activities are not yet strong enough to motivate a more learning oriented attitude, but a lot of analysis and design is going on. From a customers point of view it is also a problem to leave the relaxed social room where attendance teaching is performed. If the drop out of the education is to be low, the focus on the learning process must increase to bring didactic, pedagogic and technology together at such a high quality level which attracts the customer and improvements must be made by the educational developer. In distance learning it is important to get the learning process to work supporting the ability for individual learning thus increasing continues competence development and also, that the learner is aware of it.

More and more on-campus students are going on-line at home, and it would be reasonable to investigate if individual learning to a larger extend can be used intensively reducing the traditional attendance teaching with the same factor. This will help to merge development and maintenance recourses for both on-campus and off-campus learners.

Increasing individual learning is not easy but can be supervised and planned by the developers by using appropriate pedagogic format and technology. This is what this article about.

A pedagogical format can be defined as (a Borch O., et al., 2003):

- o The information in itself (the pedagogical resources)
- o The way the information can be read and navigated (the pedagogical scenarios)
- o The graphical style of the published supports (the pedagogical composing)
- o The pedagogical actions expected from the learner (the pedagogical activities)

2. ON-CAMPUS

The interpretation of PBL used at Aalborg University (AAU) for more than 25 years is problem oriented and project organized, and the results are very fine in terms of motivation and learning (Fink 1999).

The fixed theme for the project work and the supported courses are fundamental anchors in the personal learning process.

The project organized group work is forming a professional and social room keeping the individual in a tight consuming and producing community. The group supervisor is guiding and helping the project to follow the track going through the most important topics and looking after an equally distributed workload between members concerning complexity. The supervisor also encourages the group members to setup reflection and reading processes to stimulate the learning process.

Traditionally and scheduled teacher driven courses are given to support the project work (PE-courses evaluated via the project) building up parallel competence for group members to be able to improve and work together on equal basis. The problem with those courses is the balance between theories, methods and direct instructions useful for the project work. Another problem is the course scheduling itself, which seldom is matching the progress in the project work and thus out of phase in terms of motivation.

Other courses are also given (SE-courses) which have a special exam and thus indirectly motivates. For all types of courses, students are not well prepared before the teaching session. This influence the teaching

session to be more one way-process with few questions from the audience to be more clearing up than reflective. If the individual preparation could be stimulated, it will improve the learning process dramatically, witch has been observed where a course – due to a small audience – was turned into a study group. Subgroups of 3 to 4 participants on shift took the responsibility to prepare themselves and present topics for the rest of the study group. Another subgroup was selected to be the opponent group and the rest of the participants were encouraged to put up reflective questions.

In short, the on-campus project organized group work is forming a tight effective social forum for development, where communication and reflections takes place in a communicative high bandwidth environment. The way courses are developed, managed and scheduled gives problems in terms of lack of preparation and out of phase motivation.

3. OFF-CAMPUS

When AAU started developing off-campus on-line education, it was obvious to use the same PBL interpretation as on-campus. After 2 years of operation in the Master of Information Technology (MII) distance education a lot of results were collected and the experiences are used in the new design and implementation (Knudsen M., et al., 2003).

At the distance the virtual project room has large communication delays and the social environment is weak. Compensations were needed and all sorts of appropriate communicative applications were used like email, news-groups, chats, and audio-meetings. Reflective forums were established, but rarely used. An important feature of the MII was the regular physical meetings where project discussions, status and planning took place. The responsibility for the project among members of the group was strong, and the major (only) place for anchors in the learning process. This strong focus on the project work removed resources from courses and thus the method and theory providing activities (Knudsen M., et al., 2003). On the other hand, the students requested knowledge when they needed it, and therefore the motivation was dominant for searching and reading. It turned out, that traditional courses dumped on the Internet media was less attractive for the project work than courses developed to help and guide the students in the individual learning process. Alternative courses from other providers then from AAU were also used by students, fitting better into the individual wishes in terms of presentation and pedagogical methods.

At the course side, the students were also left alone in the virtual classroom and nobody to discus with and no group to reflect immediately in. On the other hand, taking the course freely in time and space and synchronized with the project work improves the learning and stimulates self-reflections. Still group reflections are typical missing on course topics.

To secure the parallel competence development among group members, a well formed time schedule for the project work must exist along with well defined learning goals. Only by using such milestones, it is possible to collaborate on equal basis. At MII it was observed, that dropping out of the study was also due to increased distance in specific competences.

Sub-conclusion

In short, the project work is also very attractive when it comes to on-line education, even in the virtual classroom missing proximity and immediate reflective environment. Courses are only attractive in the virtual classroom if they are developed to fulfill the individual expectations in terms of pedagogical methods, project supported contents and accessible free in time and place too. Reflective environments, such as news-groups, are seldom used.

3.1. Course development

Providing courses and other services for participants in an on-line environment requires an appropriate way of organizing recourses to be accessed at one single site related to the specific education. The user interface should be created to make interactions possible accessing resources stored at the educational site. Many different tools are used at the client side (consumer actor) so different converters and viewers are needed at the server side.

Some standards are available for presentation and storage of educational resources on a digital platform. LMS (Learning Management System) is a standard expected to manage activities **during** the training and LCMS (Learning Contents Management System) is expected to manage content production **before** the training. In Figure 2 the deployment diagram is shown. The content actor is managing the content to be used in services to the consumer actor like students, printers and application programs. The database is the storage for the content leaving out any kind of presentation and XML (eXtensible Mark Up Language) is the appropriate logical storage format to use. The presentation style is chosen according to the consumer actor, e.g. the presentation format HTML, which is constructed by using a XSL (eXtensible Style sheet Language) script to interpret the XML.
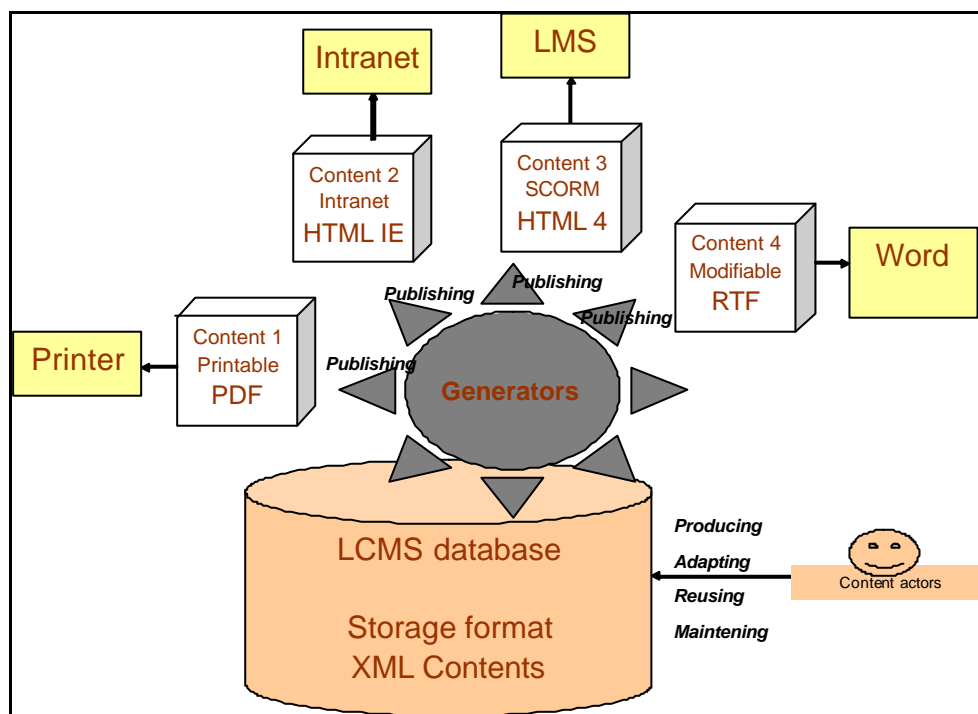

Figure 2 Deployment diagram for LCMS and LMS nodes. The architecture is typical used in a digital platform (a Borch O, et al., 2003). SCORM= Sharable Content Object Reference Model (http://www.adlnet.org/)

Realizing the learning management helps to organize and develop digital platform services faster and at the same time optimizes reusability and collaboration between educational providers. The UniFlex (University Flexible learning tool) digital platform (Uniflex, 2002) is one simple example which stores information's in a simple SQL database, and when requested by a HTML client, the generator extracts data from the database in the XML format and associates an XSL scripting file.

The teacher is the moderator for the learner and must prepare materials to facilitate the learning process. This is the task for the teacher in the developer role. The ingredients are the content subjects, pedagogical format and technology. In the attendance classroom the teaching process is based on a subject and the pedagogical format used may be planned and changed dynamically during the teaching session. The technology used to support the teaching process is very teacher specific.

When it comes to distance teaching, the pedagogical format used must be selected carefully in the planning phase and supported by appropriate technology. How a course is delivered is a matter of the digital platform and the quality of service in the network infrastructure. A web-based interface is recommended bypassing firewalls, and at the same time meeting the most commonly used internet client tool – the Internet browser.

The developing path is shown in Figure 3. Materials are collected and the operating environment is recognized such as communication facilities, developing tools offered, system constrains like minimum network requirements and user requirements.

The collected raw materials are structured according to the recommendation script offered via a template, which contains two major elements described in the next chapters:

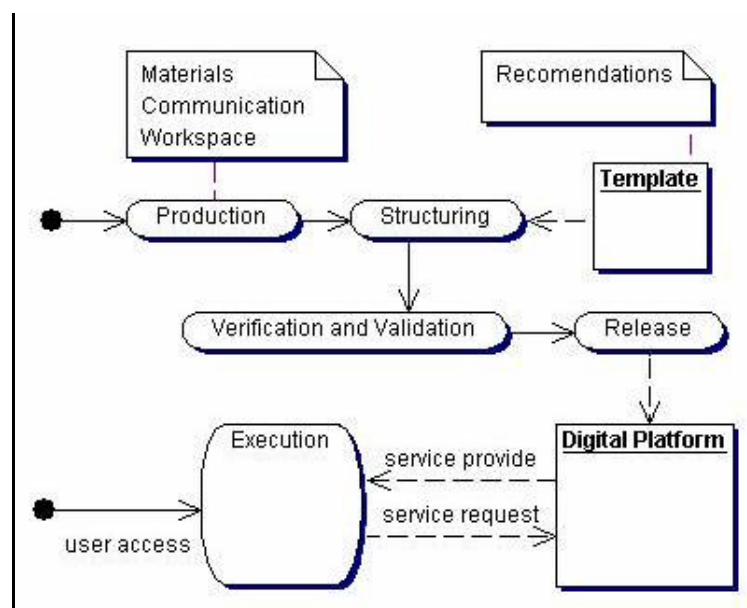- Course structure
- Learning path

Figure 3. Course developing path to be used by the teacher in the developer's role. (UNITE 2000;a Borch O., et al., 2003)

Next the structure is verified towards the study regulations and syllabus and validated towards the learning principles and the behavior of the learner target group.

When finished, the product is released by uploading to the digital platform inside the LCMS to provide services to the user. An upload is essential for more reasons:

- A fixed product release
- Stable document infrastructure such as stable anchors and hyperlinks
- Controlled authorized access to protect materials or at least a user registration

- Possibility to monitoring access activities
- Backup support

The digital platform is acting as a service provider for user requests, and the service access point at the client side is recommended to be organized in 4 major groups:

- Communication
- Information
- Courses
- Project work

One example of a digital platform is UniFlex (J. Helbo, 2001; Uniflex, 2002; b Borch O., et al., 2003) developed at AAU offering the 4 groups of services and the services provided in each group are depending of the user profile (teacher, developer, student, supervisor and guest).

The communication group is more than email, aliases and general discussion it also contains forums for each course and for each project work used in reflective sessions.

3.2. Course structure

The course structure used in the template in Figure 3 is defined in Figure 4 and can be constructed by using different type of authoring tool. One example of a powerful tool is FrontPage from Microsoft which has a graphical user interface for constructing and maintaining the structure – called a web. Validation checks of hyperlinks, internal navigation and maintenance of a structure file for later use in the digital platform are important features (course template example can be found in: Uniflex, 2002). Simple tools are a lot more time consuming for the same quality and stability.
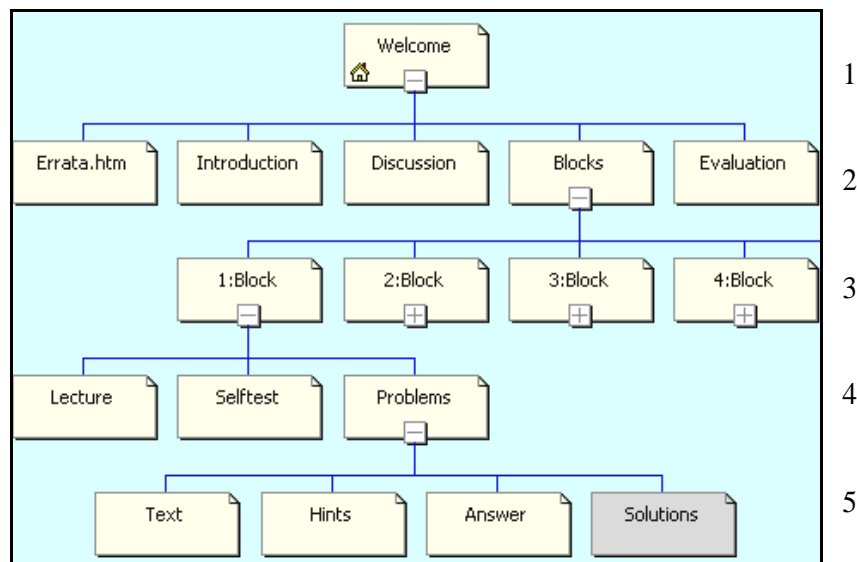

Figure 4. Recommended course structure as a set of interconnected elements. (b: Borch O., et al.,2003)

The structure must be simple and well formed to separate different kind of activities. The internal navigating must be logical and easy to adapt, so the knowledge of the structure itself must be known by all users and fulfilled by the course developer.

For the course, the welcome layer (layer 1) is about the course and followed by a management layer (layer 2). Layer 3 – the session layer - is a set of topic specific learning blocks encapsulating the learning activities. Every block has the same structure in layer 4 and 5.

3.2.1. Layer 2 – The management layer

This management layer contains information's needed for taking the course such as defining the environment, context, conditions and constraints. By collecting and encapsulating information in a structured way, it helps the customer to navigate and find information's needed. There are 5 management elements.

3.2.1.1 Errata element

When a new version of the course is released by the developer, the changes (when, where and what) since last upload are registered in the 'Errata' table element. Thus the user is able to take action like downloading the new version of the course and to make corrections according to the modifications made. The developer must be aware only to release few new versions during the course taken and focus on increments rather then iterations. The table is cleared before the course is delivered once again.

3.2.1.2 Introduction element

This element is the container for aggregated resources such as course environment, conditions, and resources among others and specified in the following list.
- Study load as specified hours spend in average
- Course syllabus or a link to the study board maintained site. This includes prerequisite, objectives, results and list of content.
- Explanation of course structure
- Used communication channels advising how to communicate when taking the course
- How problem solving is organized in terms of help and submission of solutions
- How self test should be used and description of the value for the user and the teacher
- How the evaluation of the course is performed
- List of references such as books with online graded recommendations, on-line hyperlinks and link to local CD supporting the course
- Recommended and required tools and related links

3.2.1.3 Discussion element

The objectives for this element are to describe and set up the context and motivate the participant by using considerations as 'carrots' to inspire the participant. Also a course content overview description and especially why the course should be taken are described.
The course position in the continuous competence development process is described. Facilities such as FAQ (Frequently Asked Question) and examples are very much used as motivated aggregations.

3.2.1.4 Blocks element

Distribution of subjects into learning blocks is described such as importance, load and complexity. Argued and recommended learning path and use of additional external learning activities are mentioned here.

3.2.1.5 Evaluation element

The course itself may be evaluated here by using an electronic form, but also conditions for examine and evaluation of the participants goes here. Link to the discussion forum is also inserted as well as the possibility to submit remarks to the course.

3.2.2. Layer 3, 4 and 5

The main learning activity takes place inside a block.
At level 3 the block itself is described with:

- Objectives for this learning activity
- Study load
- List of topics and brief introduction
- Reading information, recommendations and reading advisory
- Result of this learning activity

Layer 4 and 5 is a structure of elements supporting the recommended learning path inside a block as shown in Figure 5.
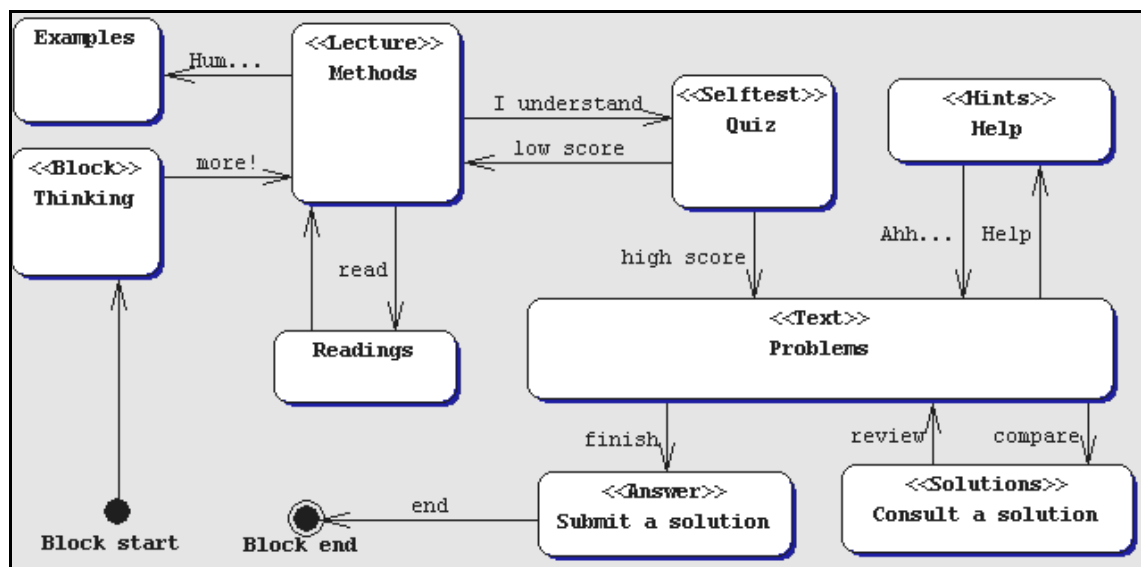

Figure 5 State diagram for the learning process in each block. (b Borch O., et al.,2003)

The support of such a state diagram for learning process is a valuable guide for remote studies, since the supervision is not available like in on-campus sessions, where the teacher often is managing the process. The activities also contain a self-test facility for guiding the participant when to leave the lecture part and take the training exercises. The *lecture element* is replacing the classroom teaching activity. Like in the classroom the lecture quality is based on pedagogical methods chosen, teacher style and variations in use of effects. Examples, best praxis, discussions and reflections are important activities as well, strengthening the learning process.

The lecture element should motivate and guide the learner through the topics for the block. First the materials are presented, and then one of more topic blocks are filled in as a) context motivation presented as an overview pointing out important areas to prepare the learner for the readings for the following b) advised reading activity. The lecture element can be supported by examples, questions, audio and video clip.

The lecture element contains:

1. About materials used in this block such as slides, audio, video etc.
2. Topic block (one or more)
   o Topic motivation and FAQ (This is an important and valuable task)
   o Detailed list of readings

The *quiz element* contains information's about the area tested and the conditions such as repeated self-test possibilities, one try only and if the results are registered. The quiz itself may be located on a general purpose quiz server, where the teacher has uploaded questions and answers, and from where a specified URL is returned and may be stored in the quiz element.

The *problem element* contains the objectives and conditions for the problem solving activity. The problem to be solved is in the text element and links to the on-line helper *hint element* are embedded in the text. If the results are going to be submitted, the conditions and method is described in the *answer element*. If the teacher's solutions are offered to students for comparison, the *solution element* is part of the course element navigation.

Sub-conclusion

The course template developed has a structure supporting a learning path, which filled in as described may guide and help the learner to adapt the contents in a better way when it comes to individual learning.

4. MERGING EDUCATIONAL ENVIRONMENTS

Seen from the educational organization, it could be reasonable to consider first of all to improve the learning processes and then to optimize resource spending in development and maintenance of on-campus and off-campus environments. Taking the best from the two activities, organizing the learning processes and using the same materials is an option to a large extend, but changes in behavior and styles among students, teachers and in the organization might be a difficult innovative process.

4.1. Courses – (off-campus influence on-campus)

Investing in course material containing high quality of pedagogical methods and using the appropriate technology has shown an improvement in self-training in the off-campus environment. At the same time preparation activities and reflections among on-campus students are not satisfactory, so it could be a good idea to adapt the course development from off-campus – as described in the previous chapter - to be used on-campus as well. This requires a change in the way courses are given on-campus so a 'teaching' session will be turned into a more reflective session, which was a success in the study group mentioned in chapter 2. One course session instruction scenario could be:

> *"Within the next 5 days, you prepare yourself from the course material (URL=xx) session 3 for the next course reflection session. You also must take the multiple choice test. Peter,*

Poul and Mary are going to put up questions in the forum[1] starting the reflective process. All other course participants - including the 'teacher' - will join the reflective process on session topics."
"After the reflection session the problem solving is performed in the project groups and compared with a suggested solution released dd/mm/yy on the course news forum."

For students, the change in the learning style is a major change in mentality, since they have been using the classroom for years in the education system and got used to traditional 'teacher controlled' teaching. The new style in the sense of preparation before the session is seen as waste of time if the usual attendance teaching style is offered for at the on-campus students too. This was observed in a course, where the new course style was offered the on-campus students. Asking the students in the classroom, they found the on-line material very good, but few took the opportunity to prepare themselves - as some students said: "Why do self study if the teaching is still performed" (It is easier just to listen!) The student's workload will increased by using the new style, since more reading in advance is required to participate qualified in the reflective session. From experiences in study groups, some students can attend passively, which is of course not wanted. From the Virtual University in Monterrey in Mexico this is avoided by requesting the students to write down reflections in a personal reflection logbook, which is taken into account at the exam. For teachers, the new style is also a challenge, both in the developer role and the teaching/moderator role. The major obstacle for the innovation process is the well acquired autonomy and right in using pedagogical methods and technology. Competence development in the organization is required to learn how to reduce teaching as instruction giving and increase teaching in theory, methods and to stimulate interactive reflection processes. Supporting the new style also means to follow recommended pedagogical methods and technology, witch also is a barrier for developers.

4.2. Project work - (on-campus influence off-campus)

Project work is working very well on-campus at AAU (F K Fink, 1999), but the reflective processes related to the supporting PE-courses and the support from those courses could be better. Off-campus project work also seems to be well organized by taking the courses before starting the project work (Knudsen M. et al., 2003). At on-campus this sequence is controlled by scheduling activities in class rooms and group rooms, and at off-campus an on-line calendar is used not as a control facility but as a recommendation.

Using the on-campus way on the off-campus doesn't mean that the on-campus method is good enough.
- o Should PE-courses disappear and be replaced with activities in the project work to increase motivation as a kind of work based learning?
- o Should the project work include formal reflection sessions and a personal learning logbook or portfolio?

Anyway, in both 'campuses' a well defined project work time schedule taking the learning goals into account is required to obey the demand for parallel competence development.

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[1] Forum may be a classroom for on-campus students and a course reflection news forum for of-campus students. The start and length of the reflection session is defined in advance.

5. CONCLUSION

Higher educational institutions are able to collaborate on a free competitive educational market by focusing on the learning process. Reaching such a state needs new management competences and teacher competences at the LCMS level. Reusability, standards, new pedagogical format and advanced technology are keywords reaching high quality on an open market. Building in that quality in the on-campus educational environment will also improve the individual learning process in terms of preparations for reflection sessions.

Not underestimating the effort for changes, it is possible to merge on-campus and on-line activities gradually with an open mind and getting inspired and learn from institutions which already have been on its way for a long time. The changes need new competences and reorganizing resources rather than increasing costs.

A common set of activities and styles for on-campus and on-line educations in terms of development, maintenance, teaching and learning is possible, but the barrier is the mental change and the willingness for changes among students, staff and in the organization.

The used style for courses has been tested in the off-campus situation, but need to be tested on-campus along with the new teaching method turning classroom teaching into reflection sessions.

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