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Quality Management in eLearning at FH JOANNEUM,

University of Applied Sciences

Abstract

This paper presents the general approach of the quality management in eLearning at FH JOANNEUM and a special focus of the QM-implementation in eLearning in the part time degree programme Software Design. Starting with an interdisciplinary reflection on the topics technique, psychology, didactics and economy a theoretical framework was developed. During the first two years the technical environment and the learning outcomes were observed in detail. The next steps of development which will focus on the collaboration of human beings in the virtual room are outlined.

Introduction

There are several external aspects of quality management at FH JOANNEUM. Since 2005 the forms for the accreditation of new degree programmes that incorporate eLearning contain an attachment where the aspects of didactics, technique, training and cost for eLearning have to be described in detail. Moreover the FH JOANNEUM has to undergo internal and external audits and finally a formalised evaluation of all lectures has to be done (a special part for eLearning lectures had been developed).

At FH JOANNEUM eLearning has been used in several degree programmes for some years. At the beginning only a few lecturers - the so-called 'early adopters' - included some aspects of eLearning in their lectures, but now eLearning has become a new and successful way of teaching and learning at the FH JOANNEUM and every year more degree programmes include eLearning as a teaching method.

Involved actors

The institute ZML – Innovative Learning Scenarios was founded in 1998 as a research institute at FH JOANNEUM. In international, national and regional projects the ZML team deals with a broad range of eLearning concepts and techniques. Results and experiences of those projects were used to support eLearning at FH JOANNEUM in order to achieve a good international standard. In the first years when eLearning was introduced the teaching staff[1] were well supported in their work. In 2005 the "eLearning Strategy for FH JOANNEUM" was developed together with eLearning experts. The ZML team offers training courses for eModeration, didactics in eLearning and technical support in using the learning platform.

The motivation for the degree programme "Internet Technology and Management" to create a new part time programme was that a lot of people in Upper Styria, who were interested in IT-related further education were already working in different branches and professions. So it was a challenge for FH JOANNEUM and ITM especially to develop a curriculum for part time students and to initiate a process of change concerning the teaching and learning environment of our students and also lecturers. As the degree programme "Internet Technology and Management" together with the part time course "Software Design" are located in Kapfenberg, a small city, about 60 km out of the Styrian capital Graz, we decided to create a program that is embedded in a "blended learning structure".

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[1] This includes full time lecturers and freelance lecturers, mostly instructors from industry and other building institutions as well.

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Blended learning in our case means a combination of eLearning, distance learning and traditional classroom learning. So the team members of ITM and ZML were looking for a learning platform. As we could not find any tools that would have met our requirements, we decided to develop our own platform – called eNcephalon – using open source technology. This was a good solution because the lecturers of ITM have a lot of experience in using Open Source Software and thus we were able to also find a lot of partners in the (Edu-)Plone and Zope-community. To work with Open Source Software means on the one hand side to trust the community and on the other hand side to see Open Source Software as a possibility for quality management in the software development circle, because Open Source Software is controlled and tested by its users (in the EduPLONE Community and by our lecturers and students, too).

In the winter semester 2004 the University of Applied Sciences FH JOANNEUM started the part-time programme Software Design. Thus, eLearning was no longer just used in addition to the traditional way of teaching for certain selected courses but it formed the basis of the part-time programme Software Design. The challenges that had to be met consisted above all in adapting the classical learning and teaching scenarios to the new online environment.

- from the mere transfer of knowledge to guiding the students on how to find solutions
- from traditional general exams to midterm and end term exams
- from lectures given by lecturers to discussions between students and lecturers
- from being a lecturer to being a coach and tutor
- from an individual way of learning to a more collaborative way of working
- from the teaching of facts, static know how and hard facts to the application and implementation of acquired knowledge
- from being rather dependent on the limitations of available rooms or space for teaching and learning to a more independent way of learning
- from traditional teaching and learning aids like notebooks, notes and course books to multilingual, multimedia-based and interdisciplinary data saved on mobile entities.

In general, Quality Management must be seen in the area of conflicts between Technology, Organisation, Economy and Business and Social Culture (see fig. 1).
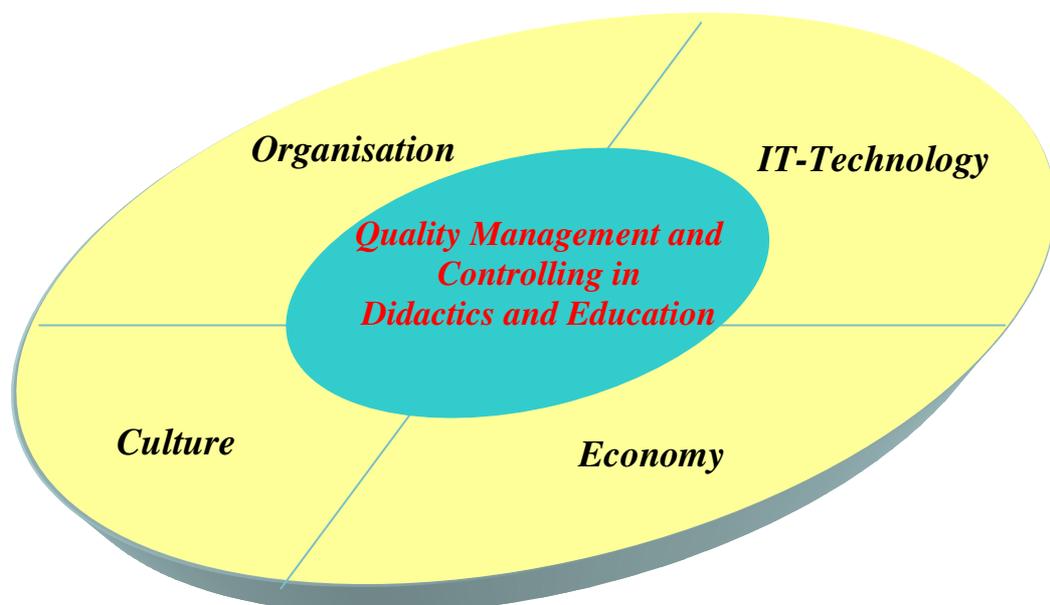

Figure 1: Components of Quality Management and Controlling in Didactics/Education[2]

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[2] This figure has been taken and adapted from the following source: „Qualität in eLearning - Konzepte und Methoden zur Beurteilung der Qualität eLearning-gestützter Aus- und Weiterbildungsprogramme - Erschienen im Oktober 2005 als Dissertation Nr. 3119 an der Universität St. Gallen (HSG) und zugleich Buchpublikation im Eusl-Verlag, Paderborn (498 Seiten, ISBN: 3-933436-61-3)"

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Theoretical background

The following paper has to be seen in connection with some well-known authors' statements asserting that in today's "knowledge society" individual knowledge and especially collective knowledge become more and more important. If knowledge is assumed to be part of a set of expectations held by today's social system, this new societal formation is less characterized by an increase of knowledge as a consequence of accumulating dates and information than by a basic change of people's meta-preferences. This is due to the fact that all societies are based on the knowledge of cognitive expectations. For this reason the world or the knowledge society, respectively also appears to be a risk society. According to the system-theoretical approach knowledge can be seen as an emergent cognitive structure of social systems or as expectations directed towards the environment and its norms. These expectations have to be changeable if required. Disappointments or failures are observed and interpreted which finally creates so called structural effects that can also be referred to as learning.
The focus has almost exclusively been on the investment in quality management systems in eLearning.

The learning structures have to be analyzed in connection with their social background which can be interpreted as an attempt to create a phenomenology of how learning takes place in groups in a digital environment. Additionally, the conditions of social learning in groups are examined. The assumption that group dynamics in a real learning environment are equivalent to those in a virtual (eLearning) environment is theoretically dealt with. This assumption will finally be called into question by looking at it from a phenomenological, systemic and pedagogical point of view (cf. Rombach, Luhmann, Benner, Gruber, Böhnisch) in the quality management context. Great importance is placed on the above mentioned learning groups because they encourage students to also communicate informally and even personally with each other. Thus, emotions besides cognitions are also recognised as an integral part of social structuring. In this case feelings supposedly serve as an immune system of disappointed expectations and as a mechanism that substitutes organisational formalizations in order to reduce the complexity of learning processes within an organization.

We assume that the presence of the WE-feeling as a kind of social capital in a learning group has a greater positive impact on knowledge creation when the members believe in the WE-feeling. Using the three dimensions of real and virtual learning groups - structural, relational and cognitive - we would like to illustrate how the circle around the WE-feeling – in all three dimensions - in the social networks plays an interdisciplinary and multidimensional role in the development of social network for life-long-learning.

a) structural dimension
Individuals develop a network with people, who have similar interests – this works the same way in traditional and in virtual groups. First, they serve as an intra-network clearing house by identifying those with relevant knowledge and helping individuals within the learning group make connections with one another. This is particularly valuable as the organization goes "virtual" and individuals find it increasingly difficult to know "who knows what." Second, they act as a reference mechanism, quickly enabling individuals to evaluate the knowledge of other members without having to contact each individual within the network. Third, they connect individuals from outside the network – other lecturers and other students - to those who are already identified as community members. We interpret this as the first step to create the WE-feeling. Therefore it is necessary to connect our two communities (the virtual students community and the virtual trainers community) to an informal social group and then build a virtual team together. If this team exists longer than the necessary learning circle (that means: after the examinations) the WE-feeling in a virtual social network has begun to work.

b) relational dimension

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The virtual learning group fosters the interpersonal interactions necessary to build a sense of trust and obligations that are crucial to form a new WE-feeling as a kind of new expression for social capital. By being able to bring people together to create and share relevant knowledge, the community creates the condition where individuals can be an individual in a group. So this is a process in a special period of time and is – as Fukuyama named it – an "informal currency" in the learning group with norms and values that are generally accepted. The individuals can develop empathy for the situations of others and can develop a rapport with individuals in the community.

c) cognitive dimension
Communities of practice help shape the actual terminology used by group members in everyday work conversations. In addition, they generate and share the knowledge objects or "artifacts" that are used by community members. The virtual learning group generates stories that communicate the norms and values of the community and of the organization as a whole. These stories enable also the new WE-feeling for the members of the social group. After some time the group has developed its own memory that perpetuates itself long after the original community members have departed.

The objective of our virtual learning communities is to form and develop a group identity in terms of the new evolutional "WE". Time, space and content are significant parameters that differentiate these knowledge communities from traditional social fabrics; none the less it seems that the development of such communities corresponds to a large degree to sociogenetic formations if the frame of reference also creates a field of sense (cf. Rombach, 287). It is a field of sense that has been formed creatively and that has also matured to become an ontological authenticity.

After closing the circle between traditional team building and new virtual teamworking it will be possible to do social networking with a sustainable WE-feeling for the lifelong learning process. By continually referring to the subsystems the creation of a common knowledge oriented and content oriented structure of conscience which is seen as an individual formation of identity and as part of a social fabric should preserve, reinforce and further develop the solidarity to the community.
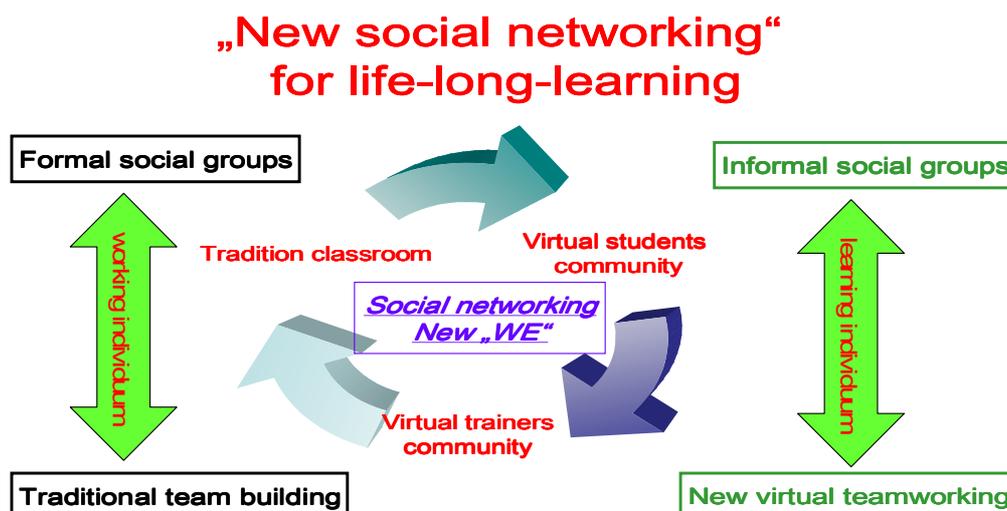

Figure 2: New social networking for life-long learning

eLearning[3] within a social network is regarded as a cyclical interplay of social substructures of knowledge and their own characteristic identities. A prerequisite for this interplay is that the

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[3] eLearning in our context means blended learning with 60:40 (traditionell:virtual)

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traditional learning environment becomes a Community of Practice in which both the "Community of Virtual Trainers" and the "Community of Virtual Students" work together. In this case the Communities of Practice are less a part of the formal social systems the learning individual is part of, but rather an integral part of informal social learning structures. The tasks, which in this case are the learning objectives of the community, forms the consciousness of the Communities of Practice within the learning structure. The collective individual that is also a changeable parameter within this lifelong process of learning has the opportunity to finally identify with this consciousness. This must be seen as a continuous improvement process in the eLearning quality management system.

The human being in its role as a social individual adapts itself during this lifelong learning process to the changing environment (in our case the learning environment or the medium of learning). The individual as part of the learning community whose sole purpose is no longer just to acquire knowledge in order to satisfy social expectations requires in addition to some informal also some personal, emotional and affective communication. These human and interpersonal factors are major conditions for forming social learning groups. The learning individual needs to find a representation of its social structures in the virtual world in order not to be degraded to a functioning monad in an "education of usability".

The virtual room

How can we ensure that the students learn, communicate and cooperate successfully in a virtual room? In traditional lectures it is often enough to be present. The learners can see each other; the lecturer has "visible" students to whom he or she speaks. But it is not possible to decide if the students are also present with their mind unless the lecturer activates the students e.g. by asking to individuals.
Learning in the virtual room changes the framework. The learner enters the virtual learning room and has to deal with problems of orientation often without help. In a first step it's not possible to "see" other students. The learner itself has to become active to find some traces of other learners or to start communicating with them.
In this process all the people involved have to acquire new skills. The students are more responsible for their own learning process. The lecturers will need to have skills in eModeration in order to support the learning processes of their students.
The design of the virtual room is crucial for the success of learning. It must motivate the students to go online and to become active/visible.

Implementation of the virtual room

eNcephalon is based on open source products which allow various technical adaptations and modifications. All features (which were partly designed by the programmers of ITM) are pluggable. Therefore eNcephalon offers a basic framework with huge expandability.

One of the open source basics is 'Plone', a portal and content management system (CMS). A content management system allows to easily handle the design and organisation of digitised data. The most important advantages of a CMS are the separation of design and content and the simple production and organisation of the content. Moreover, a CMS provides the following advantages:
- Content creators need not concentrate on design – for this reason they can concentrate on the quality of the content
- Each user may get different authorisations on the system, therefore the access to content can be restricted
- The site navigation will automatically be prepared by the CMS

All these features have a positive impact on the quality and costs of realisations based on a CMS. Moreover, these aspects are important for a learning platform used by various user

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groups. Besides these CMS relevant features, the Plone system also focuses on learning features like meta data, support of group work and the system is adequate for a huge amount of users.

The decision for Plone was based on these qualitative and financial aspects and emphasises once again the general tenor of the ITM team to focus on open source products.

eNcephalon provides a common framework for all study courses using the platform where each lecturer can enhance his/her course with the following objects:
- files
- pages
- message boards
- group folders for group work
- general folders for site organisation
- upload folders for students
- links
- images

Whereas message boards support the asynchronous communication there is a chat, an audio conference tool and a desktop sharing tool for the synchronous communication. Many lecturers use the audio conference in combination with desktop sharing tools in order to conduct synchronous online courses.

Materials and Methods

During the first 2 years a more profound evaluation of eLearning took place, the eLearning platform was tested and different didactical approaches were evaluated.

Based on the theoretical framework and the technical implementation it was important to choose a range of adequate tools for quality assurance in eLearning. A comprehensive concept of evaluation was developed and gradually implemented. The ZML developed methods, concepts and documents for the evaluation (questionnaires, observation guidelines, checklists for moderations) in close cooperation with members of staff of ITM. The evaluations were carried out by the ZML-team. Based on the results of this cooperation there exists a pool of evaluation instruments. The current state of this accompanying evaluation is documented in an internal paper of the FH JOANNEUM called "Quality Assurance in eLearning". The aim of this paper is to have different instruments of evaluation at one's disposal that can easily and quickly be adapted for other degree programmes.

Aims of Quality Management

The aims of quality management in eLearning at the University of Applied Sciences FH JOANNEUM are to further develop and optimize all relevant operations going on between students and lecturers. This continuous process of improvement is carried out in terms of the so-called cybernetic feedback loop [1] [4] [6].

For the FH JOANNEUM the specific goals are specified as followed:
- to ensure the development of quality and quality assurance of eLearning concepts and eLearning content and its adaptation to all target groups
- a transparent display of the structures of responsibility and communication
- to determine the general framework (like for instance to offer measures of further training concerning the professional as well as didactical education for full-time and part-time lecturers or to make organisational changes regarding teaching hours etc.)

- ▪ to provide an adequate virtual room for the handling of the learning process during the eLearning sessions or to adapt the chosen learning platform to the students' or lecturers' needs.

Our perception of evaluation is based on the six levels of evaluation described by Tergan [12]. On this basis we defined the objects of evaluation on each level.

Evaluation of Technical Tools (Level 1 and 2)
- • choice of platform
- • to design the platform as user-friendly as possible
- • the platform should support different teaching concepts

Evaluation of Courses (Level 3)
- • to measure the success of the learning process
- • to adapt the already existing course evaluation to the new eLearning scenarios

Didactics (Level 3)
- • to optimize the learning process in terms of a continuous improvement process for lecturers
- • to get rid of impediments
    - ○ motivation for lecturers and students
    - ○ clear structures
- • to optimize the learning material
- • to adjust the support of the online teaching process to the students' and lecturers' needs

Other Aspects (Level 1)
- • to determine to what extent internal administrative processes of the platform are supported and which additional extensions are needed/possible

Methods and Instruments used during the Processes

Criteria catalogues, observations, interviews as well as tests were introduced. Originally the framework used for the evaluations was developed for learning programmes. After some minor adaptations this approach could also be used for blended learning scenarios (a combination of face-to-face and online learning, in our case 40:60). The instruments used for this type of eLearning are described below.

Criteria Catalogues

Criteria catalogues are systematic compilations of questions and assessment charts about product characteristics which are evaluated according to certain criteria (i.e. usability, adaptability). They are on the one hand easy to use, time and cost saving and enable a standardized procedure; on the other hand the use of criteria catalogues makes it difficult to take into account individual learning conditions, situational conditions and interactions.

Observation

„Observation" as a method of software evaluation means the systematic procedure of recording people's behaviour. The method of observation is used in addition to other methods (interviews, tests), especially if the people's behaviour while using the learning software should be observed. This observation is based on any observable behaviour that can be monitored when using the software for learning or practicing purposes. The aim is to use this information as an indication of the quality of the learning software. The main function of this observation is to get information about certain aspects of behaviour which cannot easily be gained by the use of other methods.

Surveys

Surveys are used in the field of quality evaluation of learning software to get to know the different opinions of the user. A distinction is drawn between oral interviews and non fact-to-face

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surveys. The characteristics of surveys are the setting of a target, the control on the questioning and the standardisation.

Results

An evaluation of the eLearning platform 'eNcephalon' has been carried out in multiple steps. In a first step it was evaluated from a technical point of view taking into account the requirements of programmers and some internal lecturers of the study programmes Internet Technology and Management and Software Design. This checklist evaluation involving 2 types of platforms showed clearly that 'eNcephalon' is very well suited for the requirements of these groups of users. It reached 20 points out of 20 from the category 'K.O.-criteria'. In a next step the student groups got involved through face-to-face-feedback, usability questionnaires and a usability review. The results from these surveys helped to improve the platform regarding usability and functionality.

The main problem was a perceived overload of the platform, the lack of documentation, problems with the search-function and the navigation. A further specification of the functionality problems of the platform could be achieved through interviews with lecturers using the platform. Regarding the functionality these interviews showed that many of them missed further tools for supporting the synchronous eLearning parts and they required a more detailed documentation of the available tools. To address the usability issue a group of students from the degree program "Information Design" made a concept for a re-design of the platform. Furthermore, to address navigational issues the programmers of the platform started a reorganisation of the platform which now shows a more user-related approach.

Another focus was laid on online teaching. On the average about 60 % of the teaching is conducted online. Most of the online teaching is held in a synchronous way with audio conference and desktop sharing tools. The evaluation of these issues was achieved through a multilevel approach where most of the above mentioned methods delivered results. Almost all of the lecturers stated that online-teaching is much more difficult than face-to-face teaching after their first semester of online-teaching. The reasons for this can be seen in relation to the following facts:
- There is a lack of feedback from the students and a lack of eye contact to the students
- The pace of the presentation has to be adjusted to the medium and is therefore normally minor than in face-to-face lessons
- The preparation for the online lesson has to be more intensive and the spontaneity during the lesson is missing

As a consequence the lecturers had to adjust themselves to these new teaching conditions in many ways, e.g. slides for training lessons were split into smaller steps, face-to-face lessons at the beginning of the semester helped to ease the online socialisation, being prepared to answer questions outside the lessons compensated the lack of feedback during lessons.

Lecturers as well as students pointed out that the organisational background of the lesson is crucial for a good online session. Online-lessons should not be too long and face-to-face and online-lessons should alternate. Students were very keen to get the scripts and/or slides of the lesson at least some hours before the start of the lesson. Technical problems during the lesson were seen from both groups as very critical for the acceptance of eLearning. One way to avoid this risk is to provide a sound training for students and lecturers concerning the technical aspects of the platform at the beginning of the semester. Another aspect is to provide a detailed documentation for online tools. At the degree programme Software Design such trainings are delivered at the beginning of the semester including the possibility to test the online-access from the home of the users. After overcoming the first obstacles the used audio tool guarantees a steady connection.

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Comparing the marks and results of examination it was interesting to see that the students of the degree programme "Software Design" (with 60% eLearning) had at least equal marks and results as the students of the degree programme "Internet Technology" (without eLearning).

Further observations

The quality analysis of eLearning observed during the eLearning sessions of the virtual degree programme serves as a basis for the understanding of a virtual and social frame of reference. It is important to analyse the technological platform and for a high performance eLearning surrounding we have to reduce the complexity of systemic procedures if a useful reduction of social processes should be developed [10].

The part-time programme Software Design of the degree course Internet Technology and Management tries to support and develop a Community of Practice as a social system which is primarily based on communication and which is in some parts self-referential and autopoietic [8]. In this sense, our communities are regarded as group structures that do not end up in formal organisational structures but that will rather outlive them as far as content and continuity are concerned. By doing so a lasting relation to the group, the educational institution FH JOANNEUM and the subject matter IT that goes beyond the duration of their studies should be achieved. This kind of relationship of individuals to and within the Communities seems to be a factor that accompanies the lifelong process of learning, especially if we emphasize the importance of affective and emotion. We interpret this gap between knowledge acquisition / processing and social needs according to a humanistic world view and proceed on the assumption that these, from an evolutionary perspective, early mechanisms contribute a lot to the latency of these communities.

The communicative approach and the development of key qualifications that are necessary for these communities but that still need to be cultivated are major concerns of the degree study course Internet Technology and Management and its part-time programme Software Design. In this context it has to be pointed out that due to our innovative teaching methods (eLearning) the average age of the students of Software Design is decisively higher than that of the fulltime programme.

We have started our development with the technical features and the quality assessment on the IT-techniques and some special organisational aspects like facility management, HR-Management and ZIT-Services, but the next steps must be focussed on the human and social aspects for the students working together with the learning platform and eLearning must grow up to a matter of course in a learning organisation like FH JOANNEUM.
If our students are trained to do collaborative work, how to handle different perspectives of problem solution, how to do networking, then they are fit to survive in a globalized business world.

Conclusion

The aim of this paper is to present and explain our quality management experiences in a virtual learning and teaching environment. The observations made during the two years of running the part-time programme Software Design enable a detailed analysis of our eLearning environment. This process of analysis was accompanied by evaluations carried out among students and lecturers and the developers of our own open source eLearning and communication platform eNcephalon. The platform is supposed to accompany the learning process and to serve as a permanent room for the Communities.

Our conclusion for quality management in education is that we have to focus at special aims in different temporarily sequences:

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1. the technological
2. the organisational
3. the pedagogical
4. the social-cultural

After being successful in the first round with these steps we can begin the "educational controlling", which means to evaluate the effectiveness of the learning processes with eLearning and to identify it's benefit for the students, the lecturers and the university itself. That means that the organisation, the lecturers and the students are in a win-win-situation – compare it to the described WE-feeling before - with blended learning. This is one part of the puzzle growing up in a digital knowledge society. For FH JOANNEUM we can say, that after two years we are now at the end of the first round and our second and hopeful the third one is necessary for watching our improvements in the cybernetic circle.

The results of the evaluation process were helpful to improve the implementation of eLearning at FH JOANNEUM. There were profound impacts for FH JOANNEUM on each component of figure 1:

- Culture: eLearning is part of our daily life and thinking. The discussions if eLearning is useful and necessary have vanished totally.
- Organisation: The cooperation with central services (central IT, facility management and secretaries) works smooth and a new flexibility in organisational aspects has arisen.
- Economy: In the last year the lecturers of fulltime and blended learning lectures started to cooperate and to develop their learning material in a collaborative way. In the future economic advantages could emerge if the same content is used twice.
- IT-Technology: The learning platform was developed once as an open source software project. Now the platform is easy adaptable for different user groups and study degrees.

We will continue the quality assurance process and focus on the observation and evaluation of the processes in learning groups in the next years.
The next step will focus more and more on the human beings and the human behaviour, which will lead to an improved learning environment in eLearning. This helps the students and the teaching staff to develop new ways of cooperating and communicating and to deal with the challenges of life-long learning.

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