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The Hungarian Adaptation of ILIAS Webbased L(C)MS and its Use in Information Education with a Special Regard to Services tailoring

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1. E-learning, blended learning and an L(C)MS

Integrating modern information and communication technologies into the process of learning and teaching is a serious challenge in today's higher education. One of its important tools is internet based distance education and an e-learning framework.

The simplest definition of **e-learning** is such a form of education where the tool of knowledge transfer is an electronic medium. Its general interpretation is an interactive learning process assisted with technology and methodology where the relationship of the content, the instructor and the student is realized by information technology tools (Hutter, Simonics 2002). Restricting this definition, **internet based distance education** is a form of training realized by the Net or the Internet where the user interface is mostly a browser (e.g. Internet Explorer, Mozilla). The participants can join the training all over the world where Internet access is available.

Recently, according to international publications blended learning is the most effective form of education, a solution widely used by students (Kárpáti, 2003). „What made it successful is that this form of education is acceptable for traditional and distance learning institutions, with a proper tailoring because it accomplishes evolutionary improvements and development without radical changes” (Ágoston, Budai 2004).

„**Blended learning** is a wide information pedagogical strategy based on methodological learning and education theory, which ensures optimal knowledge achievement for the student integrating the diverse communication for a human existence without time and space limit. It is such an educational technology which guarantees the acquisition of the learning modules cooperatively with various specific methods. It also supplies assorted methods and tools, traditional and virtual learning methods personal and distance consultation printed and online content; all in all: a high level (hi-tech info communication tools).” (Forgó, 2004).

„Blended learning could only be effectively realized if blending is carried out in the system of education in an organized and systematic way. Blended learning strategy embraces the whole lifecycle of the education unit (plan, develop, deliver, manage, evaluate) (Singh, 2003). This could be assisted by a learning content management system – **L(C)MS** –. These frameworks could be divided into two main parts according to their basic functions:

- LMS, learning/training management system: a framework managing the process of education. Students interact with this component. It supports
 - administration of students (e.g. permission distribution, definition of user roles, importing student data);
 - concluding e-learning services (e.g. online learning modules, glossaries, self assessment tests, internet based mentoring and tutoring);
 - serving interactivity needs of internet based distanced education (e.g. tests);
 - user tracking (e.g. monitoring student progress in the learning module).
- LCMS, learning content management system's main role is to ensure the
 - creation of learning content (directly in the LCMS or with a conversion tool);
 - running of content database;
 - managing the creation of online content.

LCMS-s, after uploading the proper data and tailored and parameters set by the chosen distance learning methodology and by the actual education institution, sum up the following online educational services with a unified user interface:

- student-student, teacher-student internet communication (e-mail, forums, chat, etc.);
- web based, interactive education programs, multimedia learning modules, simulations;
- program packages assisting learning module preparation, learning module databases;
- automatic assessment test programs, helping students' self assessment, online exams, etc.;
- recommended electronic bibliography and online link collection;
- electronic glossary with instant definitions when the definition appears in a learning module.

One of these L(C)MS-s, widely used in the EU is **ILIAS** (Integriertes Lern-, Informations- und Arbeitskooperations System, Integrated Education Information and Groupwork) a web based learning module development and distance education framework. The University of Cologne has been developing it since 1997 within the VIRTUS project. Reference institutions registered at the Cologne ILIAS center, are in 20 countries, the number of higher education institutions operating ILIAS are more than 90. The framework is especially designed for higher education institutions but primary and secondary schools and for-profit companies also use it. Its user interface was translated for 21 languages, the Hungarian version is maintained by Dennis Gabor Collage (GDF). It is continually developed, the latest version is 3.7. Fulfilling the requirements of LMS-s and LCMS-s is among ILIAS' features, it also meets the standards LOM, SCORM 1.2 and AICC. Definition of permissions is role based, its software system is layered and its development is object oriented. The framework is free and open source and the running environment could also be prepared by freeware software.

2. Institutional introduction of the ILIAS e-learning framework of Dennis Gabor College

2.1. Experiments of GDF in the application of blended learning

GDF applies open system distance education supplemented by traditional education forms in the college level mass education of information technology experts in a countrywide and foreign network of consultation centers since 1992 the beginning of its operation. The principles and methodology of college level distance education has also been confirmed by practice first implemented in Hungary. It has been proven, that successful mass distance education could be realized by

- open system education adapted to Hungarian circumstances;
- designed and organized methodologies;
- learner friendly learning modules prepared for distance education;
- utilizing the possibilities of up-to-date education technology

while intensive personal communication with students (consultations, regular assessment) can not be avoided. Considering these points distance education is performed at GDF in a blended learning system, which aims at the didactical, systematic and reasonable harmonizing of the different knowledge transfer forms. The basic element of GDF education system is the printed learning material prepared for distance education (course book, notes) personal consultation and practice. Previously at GDF e-learning services consisted of: the student CD (introduction of the college and its education methodology, etc., electronic study materials), CD containing a multimedia program, the web pages of the different subjects, with downloadable materials, news and the e-mail-based tutoring. In the past 2 academic years the ILIAS e-learning services offered continually expanding supplementary options.

2.2. Institutional introduction and operation of the L(C)MS

Preparing the introduction of ILIAS

Choosing and introducing ILIAS as a framework suitable for GDF was preceded by the elaboration of a mature strategy plan. The strategy defined the places and roles of the new e-learning services within the services of blended learning depending on objective and subjective conditions. Since 2003 we have been running intensive research on the field of applying L(C)MS-s while running test courses in another framework.

ILIAS was introduced on an institutional level in the academic year of 2004/2005 first in Hungary, applying services of an L(C)MS to cover the whole organization. We have been offering supplementary study possibilities for the students in an ascending system. Because new services are organically integrated in the educational process, it triggered changes which needed to be managed continuously. The elements and relationships of internet-based distance education, accomplished at the College are summarized by figure 1.

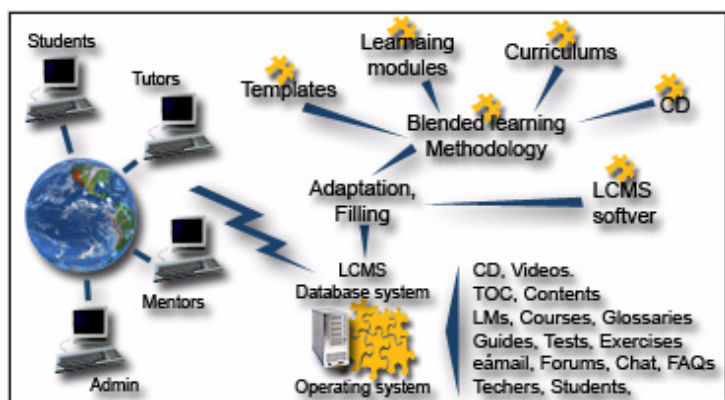


Figure 1: Elements of internet-based distance learning

Tailoring of ILIAS

Tailoring ILIAS, to be properly adapted to cover GDF operation functions, development of a **reliable running environment** (broadband internet connection server park with a background system, division of a test and productive system, monitoring, etc.) was an important cornerstone. At the time of introduction the ILIAS 3.0.1 version was installed, at the moment version 3.3.2 runs in a production mode and we are testing version 3.6.3 to be used from the beginning of the 2006/2007 academic year. We also continuously study the latest version releases.

We have worked out **the development process of e-learning modules**, established local standards (e.g. learning module style). We have inserted new elements into the learning/teaching methodology, organized **new processes of learning/teaching and self assessment** and introduced into practice (e.g. new opportunity is a self assessment test and electronic anonymous student evaluation of the subject is an old possibility in a new form in ILIAS). **New tasks and roles** were created (e.g. internet tutor, mentor). Organizational and ILIA roles end permission were harmonized.

We have elaborated **the Hungarian version of ILIAS** and we continuously maintain it parallel with the new versions. This task does not cover the simple translation of more than 5000 words and sentences appearing on the user interface, as some of these terms do not exist in Hungarian e.g. Repository but the language surface (the menu system) needs to be tested and defined according to GDF workflows (see figure 2).

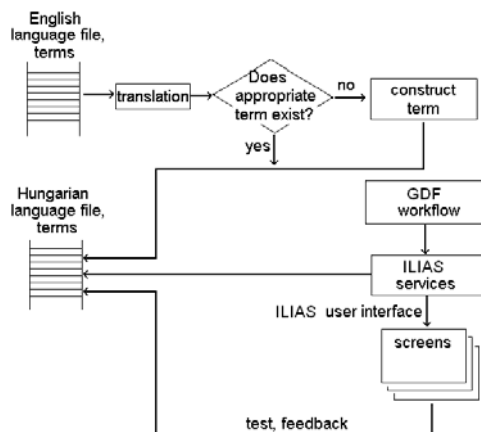


Figure 2: Creating the Hungarian language file

A preliminary condition of applying the Hungarian ILIAS is to have a proper **learning module for ILIAS users**. To teach the users in a e-learning framework simply is to create an online learning module and accessories (glossary, exercises, tests etc.) and compile an online course to learn how to use the system.

As the effectiveness of the education in an e-learning environment depends on the teachers, their motivation and training is a basic factor of success. Hundreds of our teachers and leaders, administrators and content developers received and continuously receive ILIAS training in our two institutions several times and the beginning of the academic year. Consultation centers leaders and teachers are also trained during teacher meetings at the beginning of the academic year. Students are trained in computer lab contact classes at the Budapest and countryside consultation centers.

The system could be tested by studying sample learning materials and user guides in theory and practice the online functions the system application and specific examples.

Running ILIAS in the past two years

As of 2006 June there are 6 main roles in GDF ILIAS (student, teacher, administrator, e-learning expert, system administration, system operation). The number of users more than 5000. Uploading users and learning modules into the system was perform in an ascending system. First year subjects were uploaded into the system in 2004 September also freshman received access to the system. Students have access to those semesters which they enrolled to, however teachers see all subjects.

The structure of the **repository** (content visible to users) is hierarchical. It shows the education system of the college (year, major, department, subject, see figure 3).

The repository contains, besides general features (e.g. User Guide online course or administrator forum) as of 2006 June: 82 subjects (semesters 1 to 4 and some other higher semesters subjects electronic learning modules), which include 23 HTML learning modules and general information learning modules, 22 online learning modules, 13 glossaries, 69 tests, 185 exercises, 172 forums, 5 groups, 4 electronic exams (for the experimental internet distance education training, see below), 138 online subject evaluation (by courses not by subjects).

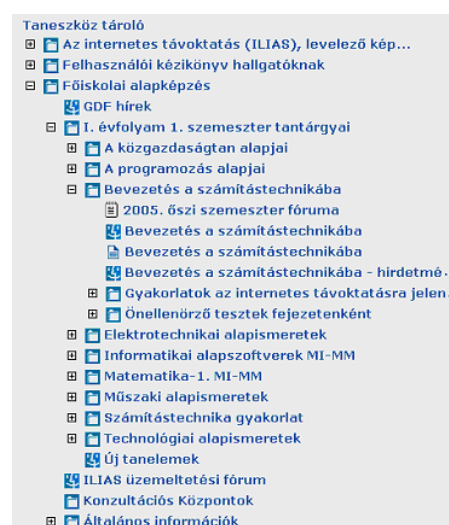


Figure 3: Repository of students enrolled to semester 1

We carried on the previous year's year practice creation subject folders based on **the subject web pages** published on the college website (see 4 figure). Besides the existing electronic materials we publish online interactive elements. Utilizing the possibilities of ILIAS compulsory elements of the subject folders are electronic subject guide and description, presentations, self assessment questions belonging to certain chapters, ILIAS subject forum and online anonymous ILIAS subject evaluation. Optional elements are online learning modules, multimedia learning modules, ILIAS online presentation, ILIAS electronic exercise, ILIAS glossary, automatically assessing ILIAS test and sample exam.

The image shows two screenshots from the ILIAS system. The left screenshot displays the 'Tananyagok' (Materials) section for 'Mikroszámítógépek (tantárgyi kezdőlap)'. It lists categories like 'Önértékelő tesztek' and 'Gyakorlatok'. Below is a forum table with columns for 'Fórum', 'Témák', and 'Hozzászólások (nem olvastam)'. The right screenshot shows the starting page for 'Mikroszámítógépek' at Gábor Dénes Főiskola, led by 'Budai Attila budai@gdf-ri.hu'. It features several resource boxes: 'Tantárgyi útmutató' (198 kB), 'Tantárgy leírása' (161 kB), 'A tanulás számonkérése, javasolt ütemterve' (107 kB), 'Ellenőrző kérdések az on-line tananyag fejezeteinek a végén találhatóak', 'Mintavizsgák Vizsgafeladat' (264,9 kB) and 'Gyakorlati vizsga' (264,7 kB), and 'A tantárgy hallgatói értékelése (on-line kérdőív)'. A note states 'A prezentáció megegyezik az on-line tananyaggal'.

Figure 4: Subject folder and starting page of the subject Microcomputers in GDF ILIAS

We assist visitors e-learning experts, students, writing thesis (from GDF and other institutions) by introducing the possibilities of the framework and transferring our knowledge acquired by tailoring ILIAS. Besides GDF ILIAS public area, we ensure the studying of teacher, content developer and student permissions in our test system. More and more high education and state owned institution and corporate companies introduced ILIAS into their education system (at the moment we know 7 such institutions who installed it), we develop partner relationships with them.

Further development of using GDF ILIAS in the academic year of 2005/2006 with model experiments

Internet based distance education methodology was tested with 3 experimental groups in the academic year in 2005/2006 at GDF. In these model experiments education is organically built on the services of the LMS:

- Students can conclude their studies with the help of hardcopy of teaching materials and **learning packages** containing the students CD, plus electronic learning modules accessible in GDF ILIAS.
- By **active mentoring** the mentor is continuously in touch with the students, answers their questions, follows their studying activities by user tracking, reminds them about their missing tasks (by e-mail or in group forum), send notices to tutors about issues requiring tutor action.
- By **active tutoring** teacher contacts hours concentrate on computer lab practices and example preparation consultations in average 3 classes per subject. Besides students

can have resort to personal internet contact and can receive professional help by e-mail and subject forums.

- Students **can check their preparedness** to exams by self assessment anonymous test, ILIAS practices (electronic homework) are also available by subject.

During the model experiment practical experiences insured the methodology of education described above. The applied distance education model can be used during the BSc training starting from the academic year 2006/2007 with minor corrections.

3. Studying strategy and style and tailoring GDF ILIAS to them

3.1. The role of studying style, studying strategy and motivation in blended learning

Electronic learning and teaching and blended learning is already integrated into our everyday life but its methodology needs to be more elaborated to be more effective. One of its possibility is considering learning styles and integrating them to the process of the learning teaching.

Learning style is cognitive a special feature part of the personality an attitude towards the word the learning, to information, psychological, phenomenon – different people approach reality in a different way. It means internal and external learning conditions, methods preferred by the individual. There are more different theoretical results recommendations about studying styles. The most well known ones are the four studying styles defined by Kolb (Kolb, 1983): doer, reflecter, thinker, decider. Very similar to these are the types of Honey and Mumford (1989): activist, reflector, theorist, pragmatist. Imre Sztó defines auditive, visual, motoric, social, silent (the importance of silence during studying), impulsive and mechanical styles. According to Ágota Szekeres studying styles can be examined and defined by several points of view: senses and modality, social environment, way of reaction, emotional conditions (Szekeres, 2005).

One of the possible definitions of **studying/teaching strategy** is a complex system of methods, tools, ways of organizations and forms to reach certain goals which lay on coherent theoretical basis has a special syntax (defining certain steps to be taken in a given order) and is realized in a special learning environment (Báthory-Falus, 1997). Studying strategy is a user specific conscious activity that's why the ways information processing could be learned and developed. Everybody can choose the most suitable strategies by knowing their own studying style.

Some authors specified a so-called studying orientation besides these ones. Kozéki and Entwistle say that studying orientation can be thorough (aims to understand things, enthusiastic towards studying in general), reproductive (builds on remembering details, teacher guidance is important), organized (fulfills objectives concentrating on results conscientious, success oriented), and instrumental (only studies for a good mark).

The main difficulty is defining into **which category the student belongs to** and the changing of the studying in time, due to changing life situations and studying. Among others Honey and Mumford created a questionnaire describing situations containing 80 statements about studying styles in the United States (with specific cultural features). Student behavior can be scrutinized by these questionnaire and after crossing the answers given to the different statements, there preferred studying style is defined. The authors describe situations suitable to the four different styles and offer suggestions to handle situations where those styles are more effective which the person filling the questioner does not prefer. Imre Sztó compiled a ques-

tioner with 34 statements with a assessment guide for teenagers which measures the dominance of seven styles defined by Sztó in the students study style.

László Kiss says that in mass education, like the basic training of higher education, such **groups could be formed** where those preferring the same style can learn separately. Their teachers who are aware this fact can teach with the methods suitable to the different groups, moreover tutors can be chosen to suit their teaching style to the students study style. According to Brophy (1978) this approach strengthens students existing specific features and the short run, but there long term interests require that teaching concentrate an the less developed areas (Sztó).

The examples of some universities and colleges show the realization of the things described above which apply the education considering study styles in practice. Such an example is one of the biggest Danish university with a 160 years history, the Odense Technical College. Before starting their studies students take a test defining which study style they belong to, by Kolb. After a conversation with an expert teacher students are grouped by their study style and supply proper teaching materials during their studies. Experiment results say that students are more successful (Soelberg, 2004).

Students entering into the Hungarian higher education have diverse IT knowledge, have a different study culture and prefer different study styles and strategies. If these styles could be considered by the tailoring of the possibilities of blended learning and the LMS functions would give proper support, than the affectedness of education would rise.

Special groups could be defined within GDF students by motivation and study skills. One of these groups is a big number of the young students with no experienced in higher and distance education. Another one is a small group of others already owning a degree. There is a big proportion of students with a high-school certificate who have no definite goals and there is a big number of students both young and mature, “who only want to have a degree”. By our daily education and mentoring experience there are different groups of those distance learning students who started their higher education studies at a higher age with little information technology knowledge at the beginning of their GDF studies but their motivation and thirst for knowledge is strong, and those who have several year’s of practical experiments but their theoretical knowledge is unfounded. The ratio of those young students who can and want to learn and their aim is to become good IT professionals is low.

3.2. Possibilities of validating individual study strategies within the present LCMS-s, experiences with ILIAS

LCMS-s already insure a collection of tools which helps the tailoring of individual study needs. One of the areas is changing the look of the user interface which includes the access of certain elements and the definition of elements appearing. It also has to ensure the comfortable use of certain functions. All these opportunities enhance user comfort but the effectiveness of studying does not grow significantly.

In ILIAS **user interface** can be change, e.g. the choice of language is given (also the framework’s and the content’s is if prepared in different languages); the style of user interface can be chosen from samples (characterized by colors, icons/text styles). The **desktop** appearing after login in may contain its own objects (practically the folder of the actual subject and the learning material being process; when the tutors “invite” a student for a practice or into a

course it automatically appears on the student's desktop). The student may create bookmarks pointing at external web pages may write electronic notes even public notes; may view personal data of online users within the system (only those ones which users allowed to be public).

Due to the features of distance education studying can not only be a passive acquisition of knowledge at these educational form by choosing any studying strategy for the learners of information technology. In the following we take a short overview of the most important elements of internet distance education.

Exercises requiring group work ensure **interactivity**, deepening and applying the information. E.g. practices, tests (self assessments or verifying), animations resulting in games and problem solving. In GDF ILIAS exercises were created to several subjects in a ascending system to practice the different parts of the subjects. Besides the description of the task assistance and the solution of the task could also be downloaded. In the internet distance learning groups students have to send obligatory exercises homework with the practice function, also they can receive extra points for the preliminary exams by solving certain exercises in specific cases. Subject within the system also contain self assessment test. The screen after taking the exam does not only contain evaluation but could also show the right answer within the learning module.

Visual demonstration with pictures, animation, videos is considerably simpler and cheaper when using an electronic medium, compared to the traditional printed one. Moreover in case of a database placed on a server storage capacity possibilities are bigger when the size of the CD/DVD. More and more animations are uploaded into GDF ILIAS which help students understanding the operation of systems, e.g. by the subjects ,electronic physic and microcomputers.

Communication between people in GDF ILIAS is properly varied. The system guarantees built-in asynchronous possibilities. Relations are differentiated by grouping the number of participants in the communication, like 1:1, 1:group, 1:authorized to view on an object. (Examples 1:1 relation – during active tutoring the tutor answers the student's technical question by e-mail; 1:group relation – during active mentoring the mentor sends a group e-mail remanding the group to a deadline of an obligatory exercise; 1:authorized to view on an object relation: a student announces an on-line sources related to a learning module in a public note. We demonstrate some more examples to show the opportunities to be used in GDF ILIAS in the following by object type.

Only administrators can create a **forum** in GDF ILIAS, these are mostly subject forums. Often 2 subject forums are created to a subject, one of them contains teacher answers to FQU (Frequently Asked Questions) and news. These forums are read only by the students. In the other one students may ask questions, create new thread (topic) and comment an them.

E-mails could be sent and received within the system and may be posted into ILIAS mailboxes or to the desktop. Receiving external e-mails are not allowed – running a separated mail server would be necessary, but messages may be forwarded to external user mailboxes. A comfortable service similar to other e-mail systems is a possibility of a name search in the user and the system address book by a person (user login name, family or first name and e-mail address) or a group.

Since the academic year 2006/2007 we offer ILIAS 3.6. In this version the **search** function can be used within the full repository or in its given level to all objects types (learning modules, tests, questionnaires, files, glossaries, forums, media pools, exercises) by content or metadata (“data on data”, e.g. learning module title, chapter title, author, difficulty level, recommended length of learning).

We have already mentioned the possibility of **electronic student notes**. Public note creation to a subject page maybe regulated on the subject level. An additional opportunity for the editors is to add notes to the pages while working.

Several **chat** application may be attached for asynchronous communication to ILIAS. Chats may be opened or closed and the right of open a chat room could also be given. An experiment was performed in 2003 in another framework to study chat use in education in our another project. We have realized during the real time classes that even if the class have been well prepared during personal consultations, unfortunately teaching one tutor can not be performed successfully with a small group. Those online classes which were not personally advertised only announced online, have only been visited by 1–2 passive students. Due these reasons we have not set up chat in GDF ILIAS yet.

The introductory summary etc., which could be found at those parts of learning modules of subjects which are prepared to hard copy distance education, helps **the individual acquisition of the material**, and the automatically self-accessing test summing up the student knowledge. If these methods prove the student knows the subject on the right level, he/she may skip the chapter. Students may test there proper level knowledge by self-assessment questions, exams and exercises at the end of each chapter. If yes, they could go on to the next chapter. The content may be divided into such parts in the course object, so a kind of programmed learning maybe realized in ILIAS.

The possibility of supporting tutor, mentor intervention tailored to the person or the group is to follow a student’s learning progress by several aspect (which course element they entered which one they completed how successfully they solved tests etc.) and the learning modules’ rate of acquisition (the number of user visit, the amount of time spent, the typical visiting time).

User **groups** are formed in the internet based distance learning model education to enhance student group support. News, homework exercises, electronic exams, concerning each groups are only visible to group members.

4. Necessary research and development to realize adaptive L(C)MS

The most possible way of creating L(C)MS-s supporting effective learning is realizing an adaptive environment. The strategy of adaptive studying developed and described by Gronbach, Glaser and Snow, József Nagy in Hungary is widely analyzed. (Google found 546000 hits on the expression „adaptive learning” in 2006 August and it is one of the topics of the 5th ILIAS international conference this year.)

The preamble is the recognition that each student’s study skills and capabilities are significantly different, so the objected is to ensure a different learning environment and study method for them. Knowing each student’s study style we can introduce them various study methods which they previously did not apply. To help this we may apply individual and group organizational methods. For this purpose first we need to detect the characteristic features of

students, their propensities to study (cognitive abilities, personality features, motivation parameters, cognitive styles etc.).

In a study dealing with active and adaptive learning Boticario, Santos, Rosmalen describe that before starting the course with experienced user group considering innovative and latent needs, the most important functions chosen from a list of more than 100 definite functions were: managing adaptive properties, communication and cooperation (because user thought that the experiment leader support it with appropriate adaptive tasks), and trusting the questioners and tests. What's more they related their results with their knowledge level but related moderately with they study style and motivation.

Adaptation on a conceptual level in the LMS aims to create a study practice adapting to various conditions (personal feature, pedagogical knowledge, student interaction and the result of the current study process) during the given period keeping in mind that success criteria define in advance should grow (e-learning effectiveness: score, time, economical cost, user satisfaction).

Considering its operation an adaptive system should be capable of “managing explicitly defined learning routes adapted to each user, monitoring the activities of its users; interpreting these on the basis of domain-specific models; inferring user requirements and preferences out of the interpreted activities, appropriately representing those in terms of user models; and, finally, acting upon the available knowledge on the users and the subject matter at hand, to dynamically facilitate the learning process”.

To provide an adaptive study environment adaptive scenarios need to be built. These cover the so called “full adaptive life cycle” which can be divided by the following four phases: design, publication, use and auditing. When **designing** an adaptive course the author chooses one or more pedagogical templates and applies them. In the phase of **publication** which covers the storage and management of all data, students and tutors are assigned to their roles, groups, personal profile and the permissions in the course. The **use** phase gives adaptive study environment which includes different features: it realizes the pedagogical and learning design created by the author, monitors student interaction and results, offers recommendations based on the learning design and user's interactions, dynamically generate questioners and adapts them according to the students development and process in the course. Finally the **auditing** closes the cycle, collects definite data on the course use and presents them in a meaningful form (e.g. study periods and activity of a certain student).

5. Summary

L(C)MS-s already contain a minimum tool collection (offering of learning modules, communication, user tracking, etc.) to realize an internet based distance learning on a user friendly surface. Scientific elaboration of utilizing of L(C)MS-s in a pedagogical aspect is not fully developed. The prerequisite of learning module development with a pedagogical demand is a comprehensive research survey on study style and sample learning modules and courses developed and tested based on these studies. To facilitate effective learning in e-learning frameworks the creation of an adaptive environment seems to be the most suitable solution. To achieve this the tools of artificial intelligent also need to be utilized.

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Imre Szitó website: <http://szito-imre.uw.hu/> (é.n.)

GDF ILIAS (<http://ilias3.gdf-ri.hu> and <http://ilias.gdf-ri.hu>) public access area of GDF ILIAS:
[Az internetes távoktatás \(ILIAS\), levelező képzés-bemutató](#) (The Introduction of Internet Based Distance Learning)