



THE REVIEW AND INTRODUCTION OF ECTS SYSTEM

Suzana Loskovska

*Faculty of Electrical Engineering and Information Technologies, Skopje, R. of
Macedonia*

suze@feit.ukim.edu.mk

1. INTRODUCTION

During the last decades, European education sector has been included in the much broader European reforms. Since the late 1990s three key documents have influenced the changes. The objectives of the Sorbonne (1998) and Bologna Declarations (1999) are to make study programmes more compatible across European systems. According to the Lisbon Strategy (2000), the European fragmented systems should be reformed into a more powerful and more integrated, knowledge based economy. The Sorbonne Declaration of 1998 pointed out the preference for a more compatible and comparable set of European higher education systems. In Bologna one year later, 25 other European countries joined the original four. By 2005 the total number of countries reached 45.

The Bologna Process aims to establish a European Higher Education Area (EHEA) by 2010. Even at the beginning the process was focused on reforming degree programmes into the two cycle "Bachelor-Master" structure, soon concerns were re-focused to quality assurance and accreditation and degree recognition. Bologna's perspective broadened in Berlin with the inclusion of the third phase (Ph.D.) and did so again in Bergen (2005) through the explicit mentioning of the importance of higher education in further enhancing research and the importance of research in underpinning higher education for the economic and cultural development of our societies and for social cohesion.

2. THE EUROPEAN CREDIT TRANSFER SYSTEM

The European Credit Transfer System (ECTS), today is the most commonly used basis for measuring student workload in European higher education. ECTS credits describe only student workload in terms of time employed to complete a course or a course unit. This represents an approach which places the student at the centre of the educational process.

ECTS was originally developed as a transfer system to make it possible for Universities in different European countries to describe the amount of academic work necessary to complete each of their course units and to facilitate recognition of students' work performed abroad. At the beginning, the assumption was made that a complete year's work in any European higher education institution for the students was equivalent to 60 ECTS credits. Credits were allocated to each assessed activity on the basis of a judgement as to the proportion it represented of the complete year's workload.

The basis for allocation of credits is the official length of the study



programme. The total workload necessary to obtain a first cycle degree lasting officially three or four years is expressed as 180 or 240 credits. The single course units which must be taken to obtain the degree can be described in terms of credits. Credits are only obtained when the course unit or other activity has been successfully completed and assessed. Credits measure only workload. The elements like quality of performance, contents or level are described in other ways. There has been a consensus around ECTS credits as a common measure of student time and in practice 1 ECTS credit is equal to roughly 25-30 hours of student work (including contact hours, independent or guided study, etc.)

3. CURRICULUM DESIGNING ACCORDING TO ECTS SYSTEM

ECTS credits today are increasingly used as a tool for designing curricula. Because they express student workload measured in time, they allow higher education institutions to plan the most effective way to achieve desired results within the time constraints of the length of their degree programmes.

Since the Sorbonne Declaration (1998) and the Bologna Declaration (1999) a debate has been initiated about the structure in cycles of the higher education sequence and about the desired length of the study programmes. A consensus appears about the following general structure, first cycle: 180-240 credits; second cycle: 60-120; third cycle: 180 to 240 credits.

In the quantitative framework, it would seem beneficial to develop course programmes on the basis of desired learning outcomes. Learning outcomes are defined as statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a learning programme. Experience with this approach has been built up by the Quality Assurance Agency (QAA) in the United Kingdom. This approach makes it possible to develop cumulative programmes, with specific entrance requirements for each of the cycles, the study years and levels as well as the course units. The learning outcomes for the first cycle and the second cycle must be clearly distinguished.

More general objectives can be formulated although the final outcomes and the competences to be acquired should be discipline/programme related. Two types of learning outcomes can be distinguished: general competences and subject specific competences. Both should have a recognisable place in the course programme and should be verifiable at the end.

Generic competences include capacity for analysis and synthesis, general knowledge, capacity for independent learning, co-operation and communication, tenacity, capacity for leadership, organisational and planning abilities. The subject related skills are the relevant methods and techniques pertaining to the various discipline areas. The same learning objectives and competences can be reached by using different types of teaching and learning methods, techniques and formats. At first glance, it seems reasonable that the more general learning outcomes should be pursued in the first cycle.

For some the introduction of a credit system implies the introduction of a modular system, that is, course units or modules, to which are allocated a limited/reasonable number of credits in more or less standard multiples. The modular system has obvious advantages, because it might prevent too much fragmentation and therefore avoids too many examinations. It also makes the transfer of credits easier. The negative aspect of a modular system is that it decreases the teaching freedom, when the amount of contact hours within the module is limited. The positive aspect is that it increases the flexibility as it becomes possible to build different curricula having points of contact between them. While in a non-modular system the choice of the material is given priority,



in a modular system it is the structure of the over-all curriculum which will constitute the primary consideration.

In any kind of system, modular or non-modular, the question of the allocation of credits can be approached from two sides: from the bottom and the top. In a bottom-up approach the course unit or building brick is the central point of attention. In that situation the position of the specific course unit within the overall curriculum is not clear. The risk involved in this approach is that teachers overestimate (or underestimate) the role of the course units they teach. This is reflected in the amount of work that a student is asked to do for a course. For students this might mean that they will not be able to use their time in the most profitable way because their total workload is too heavy (or too light).

The total number of credits needed to complete a degree or a single academic year can be divided in various ways, to facilitate the definition of courses of study and of the degree of flexibility allowed. For example, the necessary credits needed to complete a degree could be divided into different categories: mandatory core courses, auxiliary courses or complementary course units etc. Such a distribution into categories of course will vary from institution to institution. Institutions differ greatly as to the available teaching resources and as to the preparation of their students at entrance, and hence will need to distribute credits in an appropriate way to optimise the use of resources and the efficacy of the teaching learning activities.

4. CREDITS AND LEVEL

Even there is no suggestion within ECTS that credits measure level, when credits are used within an accumulation system, the rules relating to the award of a qualification generally specify not only the number of credits required for the specific qualification but also a set of sub-rules in relation to the level at which those credits must be obtained as well as the type of courses. Currently, such issues are resolved on an ad hoc basis.

A possible path forward could be to introduce extra descriptors, which go along with ECTS as an accumulation and transfer system. The consequence is that credits will be distributed over levels and type of courses. There can be distinguished the following course levels: basic level course (meant to give an introduction in a subject); intermediate level course (intended to deepen basic knowledge); advanced level course (intended to further strengthening of expertise); specialised level course (meant to build up knowledge and experience in a special field or discipline). Additionally, regard to the type of courses the following ones can be distinguished: core course (part of the core of a major programme of studies); related course (supporting course for the core); minor course (optional course or subsidiary course).

5. CALCULATION OF CREDITS IN TERMS OF WORKLOAD

The actual calculation of credits in terms of workload has proven to be a difficult issue. First of all it should be clear what is meant by credits. Credit is a measure of student workload based on the time necessary to complete a given teaching/learning unit. In ECTS terms, 60 ECTS credits measures the workload of a typical student during one academic year. The number of hours of student work required to achieve a given set of learning outcomes depends on student ability, teaching and learning methods, teaching and learning resources, curriculum design. These can differ between universities in a given country and between countries. Since credits are only a measure of workload within a curriculum, credits can only be used as a planning or monitoring tool when the



curriculum itself has been defined.

It is often argued that the typical student does not exist. How to determine the average student? There is a consensus though, that it takes time and a certain standard of preparation/background to acquire certain knowledge and skills. Therefore, time employed and personal background are the two elements that can be identified as variables in learning achievement with respect to a particular course or study programme. In this context, pre-requisite knowledge when entering a given recognised qualification is a basic element. Its actual level/amount may measurably influence the workload of the student during the course programme. Teaching staff normally has a rough idea of what it can ask a student to do in a certain amount of time in a certain programme. Furthermore, teaching staff has a clear notion about quality standards. However, it is commonly accepted that if a typical student puts in more effort into preparing an examination the grade will probably be somewhat higher. If a good student spends the expected amount of time to prepare an examination, he or she will be rewarded with a good grade. If less time is spent, the grade will probably be lower. In other words, there is a relationship between the effort and the results of a student.

In practice different approaches are used to calculate the student workload. Although there are differences common denominators can be identified also. In the calculation of workload the following items play a role: the total number of contact hours for the course unit; preparation before and finalising of notes after the attendance of the lecture / seminar; the amount of further independent work required to finish the course successfully. The last item is the most difficult one to calculate and depends largely on the discipline concerned and the complexity of the topic. Independent work can contain the following items: the collection and selection of relevant material; reading and study of that material; preparation of an oral or written examination; writing of a paper or dissertation; independent work in a lab.

The calculation of workload in terms of credits is not an automatic process. The professor has to decide on the level of complexity of the material to be studied per course unit. It goes without saying that prior experience of the staff plays an essential role. One of the main contributions of the process of credit allocation is that it leads to more reflection on curriculum design and teaching methods on the part of the teaching staff.

6. WORKLOAD FOR BLENDED COURSES

A blended (hybrid) course is taught partly in the classroom and partly online allowing the student to benefit from both methods of teaching: online and face-to-face.

Students are required to attend a certain number of on-campus class meetings and some of the required meetings are held online. In a blended course, students interact with their instructor and classmates both in person – during the on-campus meetings – and online, via web discussion forums, e-mail, chat sessions, and phone calls. The online portion of the class allows students to attend "virtual" classrooms via the Internet. Online learning activities may include writing papers, posting comments or essays to online discussion forums, completing individual or group projects, and taking quizzes. While students can generally choose when and where to complete online assignments, there are usually deadlines for homework and exams.

More formally, in each blended course the following teaching methods can be distinguished:

- Information transmission,



- Activity based teaching,
- Assignment based teaching,
- Literature based learning and
- Virtual teaching.

Information transmission includes lectures and demonstrations. Activity based teaching considers guided exercises, active demonstrations, seminars. In the assignment based teaching, carrying out research projects, writing home essays, etc. are involved.

Even though these methods for blended courses may seem similar to those in the traditional courses, the difference appears because a teacher/tutor can be present via electronic instrument and there will be no face-to-face contact. Even more so, for e-learning courses, students are working with a computer using web-based learning environments, searching for material, reading and writing (electronic) materials.

Virtual teaching is carried out via a computer network in electronic learning environments. The student workload during virtual teaching includes

1. time required for completing learning assignments
2. time required for communication with tutors and ther course participants
3. time required for reading course literature of other study material
4. time required for material search
5. time required to learn how to operate the software, learning environments and other special tools,
6. time required for possible contact teaching modules connected with the course

One approach to estimate the time for communication with tutors and other course participants (electronic communication) is to use a number of messages and words produced by a student. It is estimated that students can produce 100-200 words/hour. Eight hours are aproximately required to learn how to use each new software application, how to operate the software, learning environments and other special tools and this portion of time should be included in the student workload as well.

7. METHODS FOR CREDIT ALLOCATION

Experts identify three different methods of credit allocation [3]. These are:

- i. The top-down method
- ii. The bottom-up method
- iii. Credit allocation by reference to learning outcome.

The top-down method is the easiest method to allocate credits. Where an educational institution has a clear-cut programme for the achievement of each of its particular diplomas, then it may be relatively easy to allocate credits to various constituent modules of that programme and to do so semester by semester or year by year. In any case, the following questions may arise when applying this approach:

1. How to assess credits for modules which are essentially different in character? Some modules are lecture based, some tutorial/seminar based. Others involve writing of a report or a dissertation or yet again a thesis. Strict comparisons between such dissimilar modules are difficult.
2. How to cope with particular modules which, although involving the same amount of work for students, count for a different credit weighting when taken within different degree programmes?
3. How to deal with programme building unless one makes sure that all modules fit together in a coherent fashion?

The first question underlines just how important it is that credit allocation be



based on student effort. Experts working in educational cultures which basically estimate the weight teaching units according to teacher effort, have experienced great difficulty in calculating credits that are allocated to teaching units which are principally about student effort and have little to do with teacher effort. With respect to question 2, it is obviously preferable to avoid modules which count for different credits within different programmes because it leads easily to student claims of unfairness. As for question 3, the best way to achieve (arithmetical) coherence is to put all modules for individual degree programmes onto a flow chart so that one can see how a student proceeds from point A to point B. It also helps if all modules are multiples of the same elementary portion (basic size). For instance, an institution may decide that, since its basic size of module is, for example 5 credits, all other modules will be multiples of 5. This avoids awkward calculations for students since having multiples of 5 will make it much easier for them to construct programmes consisting precisely of 30 credits for a semester or of 60 for a whole year.

The bottom-up method. This method of achieving coherence in the allocation of credits to individual units or modules consists of calculating student work load. This is achieved by counting the “hours of work”.

The weight of student work effort in the United States is often formulated in terms of the number of Student Work Hours. Even though this concept is a highly developed theoretical concept, it has rarely been applied. More attention is concentrated on how many actual hours it takes a student to accomplish the work for a specific module.

The method involves attempts to calculate how many actual or real hours it takes a student to accomplish the work involved in an individual module or all the modules for an entire semester or academic year. This method frequently encounters an opposition from certain teachers, because it is obvious that individual students, according to their particular talents and to their various degrees of interest, will take different numbers of hours to accomplish the work involved in a given module. The highly professional statistical surveys which have been carried out all over Europe in recent years give consistent answers about the average student. The average student in Europe estimates that he/she requires 1600 +/- 200 hours to complete an academic year work. This means that 1 ECTS credit is equivalent to something between 25 and 30 hours of work.

The method of credit allocation according to learning outcomes. The best way, at least theoretically, to calculate the number of student hours for successfully completing a new module, is by being very precise, during its planning stage, in identifying and enumerating the learning outcomes and competences.

Learning outcomes may be defined as statements of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning. When used in association with their related assessment criteria, learning outcomes reflect the level of learning. In other words, learning outcomes define what a student who successfully completes a particular module or course will know and be able to demonstrate or be able to do.

The use of learning outcomes in describing programmes and individual modules helps to establish programme equivalence. They indicate not only the equivalence in terms of the contents of modules, but also the equivalence in terms of the volume and the level of those contents, too.

This method of credit allocation by reference to learning outcomes enables the curriculum developer to look at exactly how much student effort is necessary to achieve the specified outcomes. In other words, it establishes a clear link between a predetermined number of clearly stated learning outcomes, on one hand, and the number of hours, that the average student will spend to achieve



those outcomes, on the other hand.

In theory, this method of credit allocation is excellent and it is consistently used by those who design open and distance learning (ODL) modules. These experts have achieved very high level of skills in doing just this. In extreme case, such module planners argue that it takes 100 hours of preparation to get one hour of ODL learning correctly set up. One simply cannot afford to get it wrong, especially for those who have work and/or family constraints on their student work time. To some extent, this skill is infiltrating more traditional teaching situations in universities, particularly the so-called "mixed universities" which combine traditional with ODL teaching packages.

Despite its obvious advantages, this method of credit allocation does present real problems which include:

- i. The theory and the vocabulary of learning outcomes is still rather imprecise even within the Anglo-Saxon world where it has primarily been developed. This means that academics in non-English-speaking countries are often to be found still in the process of developing a basic vocabulary for the whole area of learning outcomes.
- ii. Much work is still in progress on reaching commonly accepted definitions of levels of learning. Levels, it should be noted, are not necessarily related directly to years of study. As the numbers of people participating in Lifelong Learning increases, the development of procedures to enable individuals to gain recognition for their non-formal learning will become even more important.
- iii. There are many teachers who, being unfamiliar with this subject, find it very difficult to produce learning outcomes for student learning for the modules for which they are responsible. This situation will improve if universities improve their quality assurance processes and provide good guidance and training in this matter.
- iv. A large part of university education is about the individual student's journey of self development and self discovery. The learning outcomes in individual cases may prove to be very different from those the teacher may have primarily had in mind. Many teachers would reply to all this by asserting that statements of learning outcomes merely lay down the basic competence level which their students are required to achieve in a given module, but this does not stop students achieving more than the basic requirement.

These sorts of objections form the very basis of the rejection by many university teachers not only of open and distance learning but also, within traditional universities, of semesterised and modularised teaching programmes, which usually accompany the introduction of a credit accumulation and transfer system. The whole point of big bang examinations at relatively infrequent intervals or, indeed, even at the very end of a long degree course, they assert, is that a whole variety of subject specific and of transferable skills, developed across a variety of different teaching units, will be displayed across a wide range of examination papers, dissertations or theses. No doubt these debates will continue for a long time.

Allocating credits according to the hours of work necessary to achieve specifically laid down learning outcomes brings us to the same problems as when student work hours are used as a means of allocating credits. The question is how to plan in such a way as to get the semestrial/yearly credit arithmetic correct. In practice, those who develop open and distance learning modules usually know in advance how many credits they will be permitted for their individual modules and, therefore, plan the learning outcomes and the total student work hours necessary to achieve those outcomes in response to this prior knowledge. They do not decide upon the credits once they have determined the learning



outcomes, rather they enumerate and define the learning outcomes as a result of the number of credits they have been allocated at a specific level. In other words, what appears to be a bottom-up method often turns out in practice to be a top-down method.

8. THE BEST METHOD FOR CREDIT ALLOCATION

It is obvious that in any given situation a particular method may clearly emerge as the most appropriate to use. Because all three methods have problems and limitations, it seems obvious that the best way to proceed is to use all three methods as possible methods, and use each of them as a check on the others. Credit allocation is not and can never be a really exact science. Credits, defined using any of the three methods, will always remain to some degree provisional.

The margin for error will be reduced if all three methods are used. In practical terms, it is to be recommended that those charged with credit allocation within universities first attempt to use the simplest approach, that is the top-down method, and then pass on to the others as a check on that method if and when it has worked reasonably well. The check is to make sure, as far as possible, that the credits allocated across a programme do reflect fairly, if not with absolute precision, the relative amount of student effort expended. Even if the top-down method of credit allocation proves a most useful and effective one, it must be remembered that working out and demonstrating the number of student hours involved in completing the work of course units or modules will increase mutual confidence in the comparability of course programmes from one educational institution to another and from one country to another. Enumerating learning outcomes will equally increase mutual confidence in establishing programme equivalence and programme levels much more firmly.

9. CREDIT ALLOCATION FOR MSC CURRICULA

The aim of the project M.Sc. studies in e-learning is to create and to implement a M.Sc. curriculum in e-learning. Since the new law of higher education in Serbia anticipate e-learning, the need for qualified experts in that field is self-evident and therefore creating M.Sc. curriculum in e-learning is essential.

These master studies should present a good preparation of graduate students for Ph.D. studies in the field of e-learning. Target groups of this project primarily include graduate students with advanced knowledge and skills in the fields of computer science, computer engineering and education. A possible target group also includes employees at any level of educational and industrial organizations which need additional knowledge in e-learning.

The Draft curriculum in e-learning is created performing an analyses of the content of the e-learning courses syllabi, that are available all over the world. As a result of those analyses, the e-learning curriculum is determined. The following categories of courses in e-learning are determined as necessary to be included in the programme: general (G) courses, learning & teaching (L&T) courses, design (D) courses, technology (T) courses, and project management (P) courses. The curriculum covers all the mentioned areas, including at least one course per area. Additionally, all the courses are divided into core and elective types. The Table 1 shows determined courses and their types and categories.



Table 1. List of courses

No.	Name	category	type
1.	Introduction to eLearning	L&T	core
2.	Teaching and Learning in Online Education	L&T	core
3.	Instructional Design and Course Development	D	core
4.	eLearning Tools and Technology	T	core
5.	Learning and Training with Multimedia	T	elective
6.	Learning Management Systems	D	elective
7.	Learner Support in eLearning	T	elective
8.	Adult Education and Life Long Learning	L&T	elective
9.	Management of eLearning projects	P	elective
10.	Assessment in eLearning	D	elective
11.	Infrastructure of eLearning Environments	T	elective
12.	Research Methods in Distance Education	G	elective
13.	Professional seminar	G	elective

Taking into account that most of the courses included in the curriculum were determined before credit allocation, the top-down method is used to allocate credits for the curricula as the easiest method and most suitable for this curriculum. To achieve (arithmetical) coherence of credits for different courses the credits for all modules are multiples of a given basic size. The basic size of a module is chosen to be 6 credits and all the courses are awarded credits that are multiples of 6. In fact, only Professional seminar is awarded 3 credits and all other courses are awarded 6 credits. Figure 1 shows Draft MSc Curriculum structure in eLearning, including mode of implementation, possible outcomes, career options and list of core and elective courses.

10. THE FRAMEWORK OF QUALIFICATIONS FOR THE EHEA

The Bergen Conference (2005) adopted the overarching framework for qualifications in the EHEA, comprising three cycles, generic descriptors for each cycle based on learning outcomes and competences, and credit ranges in the first and second cycles. Qualifications of the first and the third cycle can be found in [2]. Qualifications that signify completion of the second cycle are awarded to students who: have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the first cycle, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context; can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study; have the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments; can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and nonspecialist audiences clearly and unambiguously; have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.

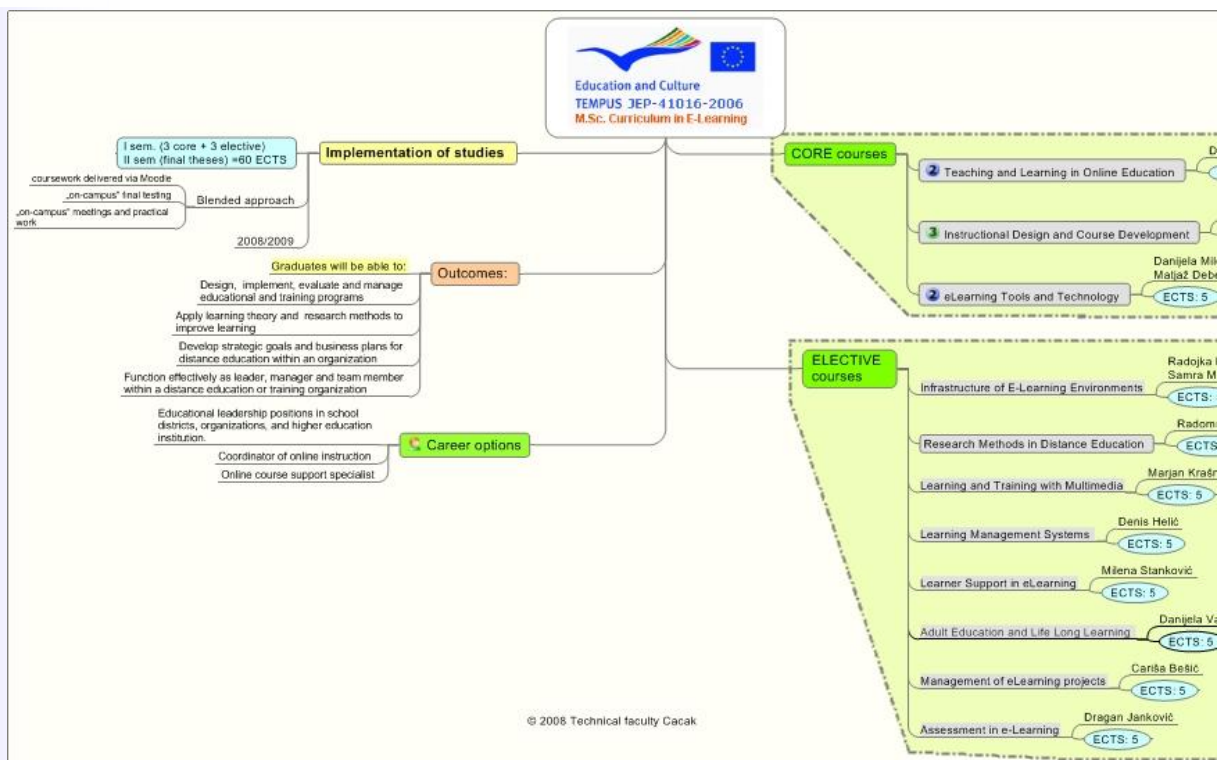


Figure 1. Structure of M.Sc. curriculum

11. ECTS AS TOOL FOR QUALITY ASSURANCE OF CURRICULUM REFORM

The quality of higher education has emerged as a key element in the establishment of the EHEA. In the Berlin and Bergen Communiqués was stressed that the primary responsibility for quality assurance in higher education lies with each institution itself and this provides the basis for real accountability of the academic system within the national quality framework.

The EUA proposes a coherent QA policy based on the belief that institutional autonomy creates and requires responsibility, and that universities are responsible for developing internal quality cultures. With the active contribution of students universities must monitor and evaluate, in a systematic fashion, all their activities, including study programmes, research productivity, innovativeness, competitiveness, management, funding systems and services.

For the EUA, the key elements in a QA process are: self-assessment by the unit being evaluated, review and site visit by peers including external peers, publication of the peer review report, effective follow-up on recommendations for improvement, minimal bureaucracy, quality improvement, and involvement of students and other stakeholders.

12. REFERENCE

- [1] ec.europa.eu/education/policies/
- [2] www.bologna-bergen2005.no/Docs/00-Main_doc/050218_QF_EHEA.pdf
- [3] R. de Lavigne, ECTS CREDITS AND METHODS OF CREDIT ALLOCATION, Counsellor for ECTS and the Diploma Supplement for the European Commission, Copyright Richard Louis de Lavigne June 2003
- [4] General Information, <http://www.europa.eu.int/comm/education/socrates/ects.html>



Education and Culture
TEMPUS



JEP - 41016 - 2006
M.Sc. Curriculum in E-Learning

- [5] Users Guide, <http://www.europa.eu.int/comm/education/socrates.usersg.html>
- [6] Bologna Declaration and Process, <http://www.unige.ch/eua>
- [7] Conclusions and Recommendations of the Conference, **The Bologna Process**, Conference on Master-level Degrees, Helsinki, Finland, March 14 - 15, 2003
- [8] http://www.tuning.unideusto.org/tuningeu/index.php?option=com_docman&Itemid=59
- [9] Prammanee, N. (2004) *Understanding participation in online courses: A case study of perceptions of online interaction*. Department of Educational Technology, Research and Assessment College of Education. Northern Illinois University. <http://it.coe.uga.edu/itforum/paper68/paper68.html>.