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Lifelong Learning Credits and Accreditation in EIE in Europe

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1. GENERAL INTRODUCTION ON THE ELLEIEC PROJECT

ELLEIEC is an ERASMUS thematic network which has been funded by the European Commission for a three-year period since September 2008. The consortium was composed of 60 partners from all around Europe. Pedagogical adaptation of Higher Education Institution (HEI) curricula at a European dimension to the job market is a key point for a fast integration of graduated students in their future work. At the same time, Innovation and research activities should be a common task between companies and HEI in the framework of the University to reach the unemployment and climate change stakes. Our project establishes, as the main output, a virtual centre for the development of enterprise skills and competencies and investigates and reports on the implementation issues and impact of Lifelong Learning on the employability of people over Europe in the Electrical and Information Engineering field.

2. BENEFITS OF A GLOBAL LLL POLICY

The general objective of the Lifelong Learning Programme is to contribute through lifelong learning to the development of the European Union (EU) as an advanced knowledge-based society, with sustainable economic development, more and better jobs and greater social cohesion, while ensuring good protection of the environment for future generations. In particular, it aims to foster interchange, cooperation and mobility between education and training systems within the EU so that they become a world quality reference. In the field of engineering education there is a need and global interest in Europe to promote and develop mobility of students, beyond the existing exchange programs like SOCRATES-ERASMUS (since 1987) program and existing bilateral agreements between particular universities. The engineering education in Europe is facing the great challenge of changing conditions on labour market, as many industrial companies work with projects across borders, which means project involving participants from different countries and cultures working together on common goals.

At the same time the future of European countries is very much dependent on the progress in technology. A great part of industrial production of all kind has been moved to the countries outside Europe and involving the management of production plants all over the world. This requires the movement of specialists and better understanding of different skills and competences in order to fulfill these tasks. The competition between different parts of the world to attract industrial investments makes it necessary to develop European policy on education, especially in engineering.

Fast changing of requirements and rapid changing in technology make it necessary to develop strategy for continuous education at all levels and to ensure recognition of qualifications and diploma all around Europe.

One part of this process is LLL in EIE. The description of LLL in the Official Journal of the European Union can be found in:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:327:0045:0068:EN:PDF>

The objective of our work was to identify, analyze and make general recommendations on the future LLL-systems in Europe within electrical engineering at the Bachelor and Master Levels. This work will help to develop attractiveness for mobility and improve cooperation between countries and universities. The recognition systems need to ensure the credit and qualification transfer within LLL-systems, internationally.

3. GENERAL PRESENTATION OF THE DELIVERABLE

The aim and objective of this deliverable is to identify existing Life Long Learning systems on the levels of Bachelor and Master in Europe within electrical engineering and IT technologies (also known as Electrical and Information Engineering or EIE), and identify and promote a European/international mobility of the students (section 5 of this deliverable). In our investigations, we used a questionnaire (Appendix A). Another objective of this task (Task 4 of the project) is to give an input at the Ph.D. level (section 6 of this deliverable). The interest of a common approach at the European level comes from the mobility of employees in multinational companies and in general from the mobility of the citizens all around Europe. The knowledge of the higher education systems with their own rules and regulations should give the good paths to give EU-citizens information about possibilities for continuing education. One of the main goals is to give potential candidates access to educational institutions/universities all over Europe, to give them the good and efficient advices how and where they can apply to fulfill their expectations for their future education.

In order to clarify the state of the art about how to obtain Bachelor, Master, and Doctoral degrees in Europe, we decided to make a survey by questionnaires, one for the bachelor and master levels, one for the doctoral studies. The target population of our questionnaires was the ELLEIEC partners (primary, one per country) and other European universities, in the countries not represented in the project (secondary). The working groups for designing the questionnaires were set up by the members of the project representing almost all European countries. These working groups have had several meetings in order to design, test and validate the questionnaires, and later on all the partners have been invited to answer these questionnaires. The answers we received have been analyzed. From this we propose, in this report, a synthesis of some existing systems for measuring and counting lifelong credits accumulation, in relation with accreditation systems (which can vary as a function of the countries), analyse the system for the measurement of the levels, the kind of recognition given (course, module, term, diploma) and the transferability of these credits at the European level, both at the bachelor and master levels and for doctoral studies.

All outcomes of our questionnaire are available on www.elleiec.eu

4. LIFELONG LEARNING GLOSSARY

In order to well understand the different approaches of lifelong learning, a first aspect consists in defining the usual vocabulary and associated acronyms. We define successively the meaning of LLL & LLP, RPL (APL, APCL, APEL), ECVET, NQF and EQF.

4.1 LLL (LifeLong Learning) & LLP (LifeLong Learning Programme)

LLL & LLP (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:327:0045:0068:EN:PDF>)

The general objective of the Lifelong Learning Programme is to contribute through lifelong learning to the development of the EU as an advanced knowledge-based society, with sustainable economic development, more and better jobs and greater social cohesion, while ensuring good protection of the environment for future generations. In particular, it aims to foster interchange, cooperation and mobility between education and training systems within the EU so that they become a world quality reference.

4.2 Recognition of Prior Learning (RPL)

http://en.wikipedia.org/wiki/Recognition_of_prior_learning

Recognition of prior learning (RPL), prior learning assessment (PLA), or prior learning assessment and recognition (PLAR), describes a process used by colleges and universities around the world to evaluate learning acquired outside the classroom for the purpose of assigning academic credits. Common ways individuals have acquired college-level learning include: corporate or military training; work experience; civic activity; and independent study.

Methods to assess prior learning are varied and include: standardized exams such as those delivered by the [College Board](#), the [Excelsior College Examination Program](#) or [DANTES Subject Standardized Tests Program](#); [American Council on Education \(ACE\)](#); Guides to credit recommendations for civilian and military training programs; evaluations of local training programs by local colleges, campus challenge exams; and portfolio assessments of experiential learning.

As a whole, Recognition of Prior Learning (RPL) is a process that allows the competencies you already possess to be recognized, regardless of how you obtained them. These might include skills you picked up on the job or from other life experiences that do not necessarily include formal training.

Recognition of prior learning suits people who have professional experience relevant:

- work skills or knowledge
- paid or unpaid work experience
- life experience
- community work experience

Recognition of prior learning could provide you with a full or part qualification, and avoid duplication of training. It could be used to identify what training you may need to complete a qualification, or could provide a pathway to higher qualifications for people who may not have access to further training.

We may identify several approaches for RPL.

4.2.1 APL (Accreditation of Prior Learning)

APL (<http://resources.glos.ac.uk/apply/apl/index.cfm>)

Accreditation of prior learning (APL) is an opportunity for students to be given credits (or equivalences) for learning that student has done before started at the University, or for studies or training that a student is currently doing outside of the University. It avoids the necessity of duplicating previous learning, whilst ensuring a system to demonstrate successful attainment of the learning outcomes appropriate to student's award. Prior learning may be experiential or certificated (next definition).

4.2.2 APCL (Accreditation of Prior Certificated Learning)

Accreditation of Prior Certificated Learning (APCL) is learning for which student will have received a formal qualification, for example a Certificate or Diploma, or individual modules/course units completed at another institution.

4.2.3 APEL Accreditation of Prior and Experiential Learning

APEL (<http://dictionary.bnet.com/definition/Lifelong+Learning.html?tag=col1:rbDictionary>)

Accreditation of Prior and Experiential Learning (APEL) is a process that enables people of all ages, backgrounds and attitudes, to receive formal recognition for skills and knowledge they already possess. A person's learning and experience can be formally recognised and taken into account to:

- gain entry to further or higher education courses,
- give exemption from certain parts of a new course of study,
- qualify for an award in an appropriate subject in further or higher education.

4.3 ECVET - European Credit system for Vocational Education and Training

(<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0180:FIN:EN:PDF>)

The objective of ECVET is to support and promote transnational mobility and access to lifelong learning in VET. While EQF (the European Qualification Framework) provides a common reference framework which is meant to serve as a translation device between different qualifications systems and their levels, ECVET provides a common methodological framework which is meant to facilitate transfer of credit for learning outcomes from one qualifications system to another, or from one learning pathway to another. It contributes to the permeability of learning systems, compatibility between autonomous education and VET systems and, in so doing, supports the possibility for learners to build individual learning pathways leading to qualifications. Its implementation is based on the principle of voluntary participation by the Member States and stakeholders

4.4 EQF - European Qualifications Framework

(http://ec.europa.eu/education/lifelong-learning-policy/doc44_en.htm)

The European Qualifications Framework (EQF) acts as a translation device to make national qualifications more readable across Europe, promoting workers' and learners' mobility between countries and facilitating their lifelong learning. EQF helps to compare qualifications throughout Europe to support Life Long Learning and educational and job mobility. The

European qualifications framework has been a catalyst for countries to develop national qualifications frameworks (NQFs).

4.5 NQF - National Qualifications Framework

(http://en.wikipedia.org/wiki/National_Qualifications_Framework

http://www.eqf-ref.eu/index.php?option=com_content&view=article&id=31&Itemid=20)

National qualifications frameworks (NQFs) aim to make national qualifications systems easier to understand and more transparent at national and international levels. NQFs describe what learners should know, understand and be able to do based on a given qualification as well as how learners can move from one qualification to another within a system. They have become integral to implementing the European qualifications framework (EQF). All countries have developed or are developing NQFs (Cedefop,2010b <http://www.cedefop.europa.eu/EN/>)

5. LLL AT THE BACHELOR AND MASTER LEVELS IN EIE

A person's learning and experience can be formally recognised and taken into account to:

- gain entry to further or higher education courses,
- give exemption from certain parts of a new course of study,
- qualify for an award in an appropriate subject in further or higher education.

The possibility of European employees to reach the Bachelor, Master or doctoral levels by the way of LLL is opened in different ways:

- entering the named programmes via APL. In this case, the students are included in the regular studies after APL procedure. Then, they graduate similarly to the other regular university students,
- passing the Bachelor level through an ECVET process. The preparation of their further educational programme will be specific to their professional profile.
- passing the Bachelor and Master levels through an APEL process. The preparation of their further educational programme will be specific to their professional profile.

Whatever the pathway, the final diploma must have the same value than a classical Bachelor or Master Degree. It is thus important to verify that the future graduate will have the knowledge, skills and competences that are required.

5.1 Questionnaire

As mentioned before, in order to visualize the present situation regarding the ways to obtain Bachelor and Master-levels in Europe, we decided to make a survey by a questionnaire (Appendix A). The target population in our questionnaire was ELLEIEC-partners (primary, one per country) and other European universities, in the countries not represented in the project (secondary). The working group for designing the questionnaire was set up by the members of the project representing almost all European countries. This working group has had several meetings in order to design, test and validate the questionnaire, and later on all the partners have been invited to answer this questionnaire.

The first version of the questionnaire has been decided at the Palanga project meeting, and after some changes and improvements the questionnaire was tested by several members of the task 4 working group in November/December 2010. At the meeting in Malta (January 2011), we have had most of the answers to our questionnaire, but there were still missing answers from some member countries in the project. During the next Task 4 meeting, in Thessaloniki, we sent reminders to the universities which did not respond yet. The answers we received have been analyzed, during Malta- and Thessaloniki-meetings.

Structure of the questionnaire

The questionnaire includes the following parts:

- ✚ Introduction, including:
 - ✓ Glossary
 - ✓ Explanation of the purpose of the questionnaire
 - ✓ Explanation of the analysis' results
 - ✓ Decided target population

- ✚ Part 1 , including questions about:
 - ✓ Information about the person answering the questionnaire and/or ELLEIEC-partner information.
 - ✓ Country specific used tools for LLL.
- ✚ Part 2 , including questions about:
 - ✓ Country specific general information on LLL.
 - ✓ Types of programmes/courses for which officially recognized LLL credits are awarded in the country
 - ✓ Admission possibilities for foreign students.

The global questionnaire is given in appendix A. At the meeting in Maribor we added some questions concerning APL and APEL to the questionnaire. These are in Appendix A (section 8.2) under “Additional Questions”.

5.2 Analysis of the results

The statistical analysis of the questionnaire has been done and the results are described below. We have received answers from 37 universities representing 27 countries and we miss 7 countries. Almost 80% of European countries have answered the questionnaire and 20% are missing.

The representing countries are:

- | | | |
|-------------------------------|---------------|------------------------|
| 1. Belgium/Flemish Community, | 10. Germany | 19. Portugal |
| Belgium/French Community | 11. Hungary | 20. Romania |
| 2. Bulgaria | 12. Ireland | 21. Slovakia |
| 3. Cyprus | 13. Italy | 22. Slovenia |
| 4. Czech Republic | 14. Latvia | 23. Spain |
| 5. Denmark | 15. Lithuania | 24. Sweden |
| 6. Estonia | 16. Malta | 25. Turkey |
| 7. Finland | 17. Norway | 26. UK/England, Wales, |
| 8. France | 18. Poland | N. Ireland |
| 9. Greece | | 27. UK/Scotland |

The missing countries are:

- | | | |
|-------------|-----------------|-----------------|
| 1. Austria, | 4. Luxemburg, | 6. Serbia |
| 2. Croatia, | 5. Netherlands, | 7. Switzerland. |
| 3. Iceland, | | |

The statistics of the answers are shown in Appendix B.

All countries, who answered the questionnaire, are aware about ECTS but not all of them are using ECTS system at the universities, 21.6% are not using the ECTS system.

5.3 Recommendation & best practices

The discussions in the working group of ELLEIEC-partners and the analysis of the questionnaire have given us the picture of the present situation in Europe. There are different practices concerning recognition of diploma and recognition of obtained competencies in different countries and even in different universities. In the following we summarize the results of our discussions and answers of our questionnaire.

- The system of ECTS credits should be implemented in all European countries, at the moment 78% of the countries do it.
- Diploma Supplement (DS) written in English will ensure the transparency and international understanding of existing educations. At the moment 78% of the countries using it, and this practice is not even general within one country, differs from university to university.
- ECVET is known in almost all European countries, but used only by 73%. Our recommendation is to work upon to implement ECTVET recognition in all Europe.
- Similar to ECVET is the situation concerning APL/APEL. There are 57% of the countries practicing APL and only 35% using APEL procedures. France could be named as an example of best practice, where there exists practice of validating complete programme, which means giving diploma in the case of APL and APEL.
- One of the key indications of taking care for LLL-continuing education of VET is having department /office taking care of it. At the moment in most cases Scholar and International departments are collaborating. Scholar department managing the choices of courses and corresponding programmes and the international department managing the administrative aspects, as well as the agreements.
- Especially there is need to improve the official recognition of the vocational training courses, as it is only 38% of the countries doing so.

The discussions in the working group of ELLEIEC-partners showed many differences in how APL and APEL are used in validation of the programme. That is why we added some additional questions during the meeting in Maribor. These questions and the statistics of the data are in Appendix A and Appendix B.

Analysis of the answers

1. We have got answers from 36 universities representing 23 countries, which is 68% of the countries in Europe.
2. 74% of the countries who answered the questions do use APL and 61% use APEL

3. 61% of the universities answering the questions use APL to allow admission for regular programme
4. 74% of the universities answering the questions use APL to allow a partial validation of the programme
5. Only 6% of the countries answering the questions use APL to allow validation of the complete programme
6. Only 43% of the countries answering the questions have national body in charge to define job profile references.

Our conclusion is that APL and APEL should be used in LLL such that it both partial and full program validation should occur, as it is the case for example in France.

6. LLL AT THE DOCTORAL LEVEL IN EIE

This part deals with the LifeLong Learning Credits and Accreditation in EIE in Europe specially devoted to doctoral studies. Similarly to the other levels, bachelor and master, the first approach consists to well defined the condition to get a diploma, to survey the different policies in Europe explained in the various Communiqués of the European Commission, and to give some examples of the first experiences in the field of EIE.

This report proposes a synthesis of some existing systems for measuring and counting lifelong credits accumulation, in relation with accreditation systems (which can vary as a function of the countries), analyse the system for the measurement of the levels, the kind of recognition given (course, module, term, diploma) and the transferability of these credits at the European doctorate level.

6.1 Aspects of LLL specific to the Doctoral level

A person's learning and experience can be formally recognised and taken into account to:

- gain entry to further or higher education courses,
- give exemption from certain parts of a new course of study,
- qualify for an award in an appropriate subject in further or higher education.

The possibility of European employees to reach doctoral level via LLL, starting from master degree, is opened in both ways:

- entering the Doctoral studies via APL. In this case, the students are included in the regular doctoral studies after the APL procedure. Then, they prepare the doctorate similarly to the other students,
- passing the Doctorate through an APEL process. The preparation of the Doctorate is thus specific.

Whatever the pathway, the final diploma must have the same value as a Doctorate obtained through the classical process. It is thus important to verify that the future doctor will have the knowledge, skills and competences that are required.

6.2 OVERVIEW OF DOCTORAL STUDIES IN EUROPE IN THE FIELD OF EIE

6.2.1 Environment to prepare a doctorate

To prepare a doctorate the student must reach a specific environment that facilitates the development of new researches. This environment is summarized in figure 1. This graph shows the main points that must be fulfilled to prepare a doctorate in suitable conditions in a classical way. For a very long time already, it is well accepted that to prepare a Doctorate a student must produce a scientific work that is mainly performed, at least in the field of electrical and information engineering (EIE), in a research laboratory or research unit. In this environment, the student may manage some technical experiences, create new tools or instruments, analyze the existing results in the international environment, propose modelling and simulation involving recent tools, etc.

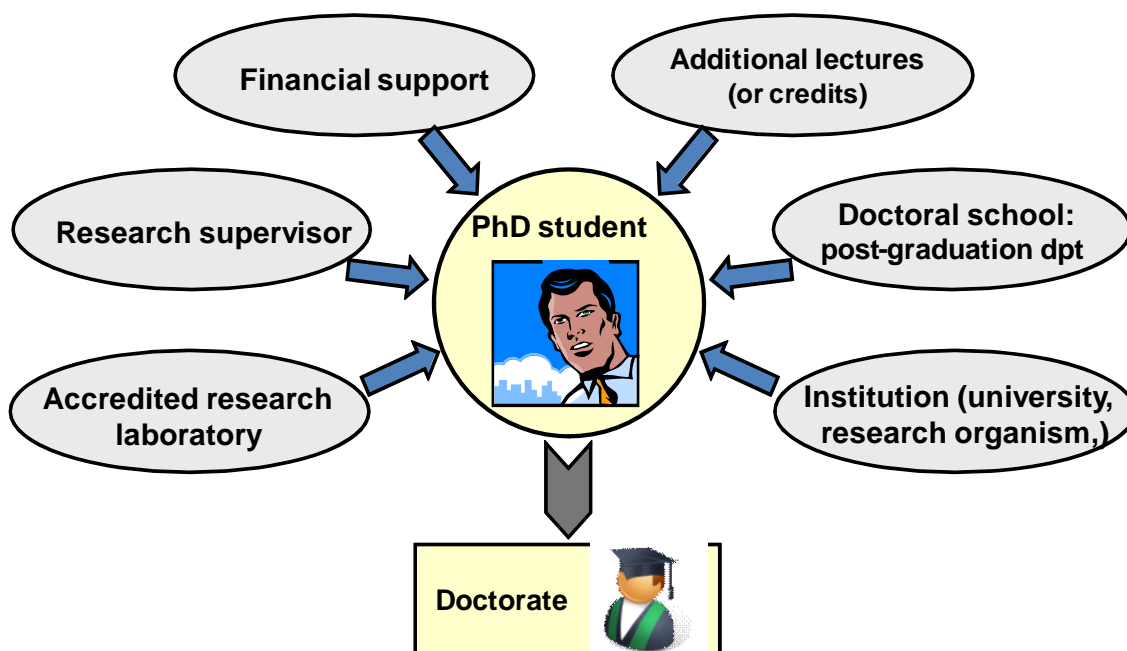


Figure 1. Main general conditions for preparing a doctorate. Not only the research environment is required; Credits of additional education or training may be required.

However, this approach reduces the education of the doctorate to a scientific work while nowadays additional aspects are mandatory: in addition to this scientific environment and scientific work, the doctors must have gained and also proved several skills and competences that could warranty their future job as well in an academic institution or research organism as in a Research and Development (R & D) service of an industrial company. These skills and competences are summarized in Figure 2. Discussions and comments were given in previous published studies. However, it is important to notice that the main idea corresponds to the capability of the doctor to manage researches, not only thanks to scientific knowledge and knowhow, if possible close to “excellence”, but also very good knowledge of the economical and industrial environment, high intrinsic knowledge including languages and communication.

6.2.2 Skills and competences of a doctor

Although the students are severely selected at the entrance of doctorate studies by the doctoral schools (or post-graduate schools, or doctoral studies Dept) and the associated research units, due to the permanent and very strong increasing of the general scientific level, additional or complementary knowledge and skills must be acquired during these studies; thus, one of the

main roles of the doctoral school is to organize such additional education or training, to ensure the quality of the additional knowledge, or in other words the improvement of the global capabilities of the doctors.

The doctoral school or Department of Doctoral studies has to warranty its skills and competences over a large spectrum in order to cover all the aspects of their future job.

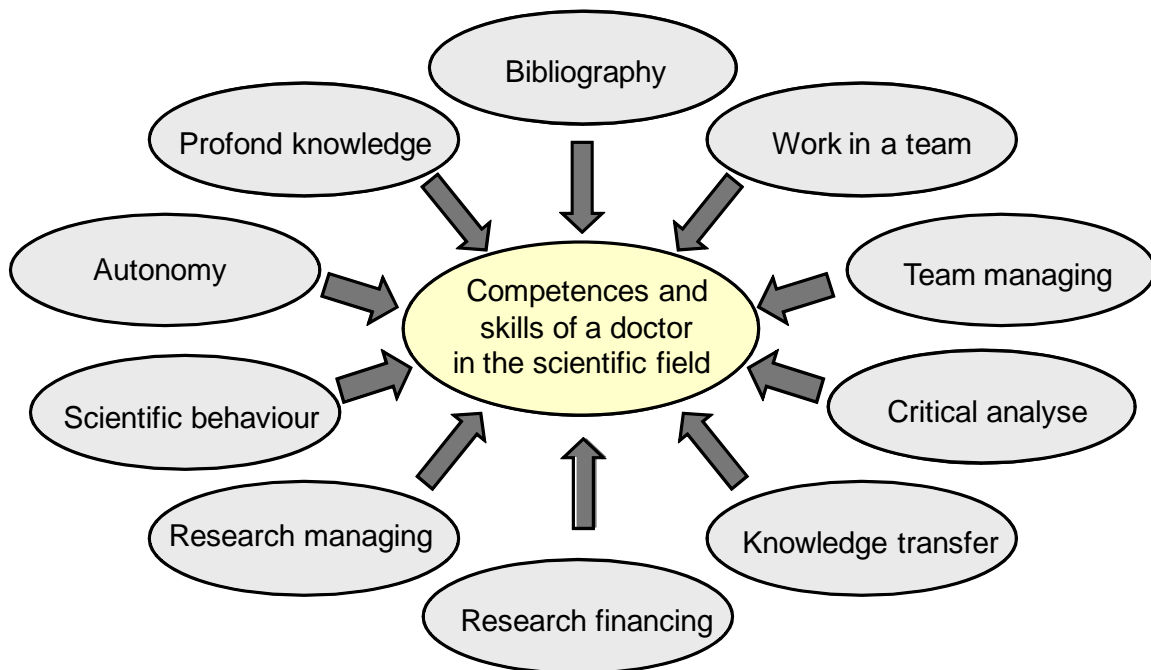


Figure 2. Required skills and competences at the Doctoral level. Whatever the way to obtain the doctorate these skills and competences should be reached by the doctor.

6.2.3 Needs and organisation of complementary lectures

Having in mind the required skills and competences of a doctor in engineering, the courses at doctoral schools are classified into three main categories,

- scientific,
- general,
- professional,

as shown in figure 3.

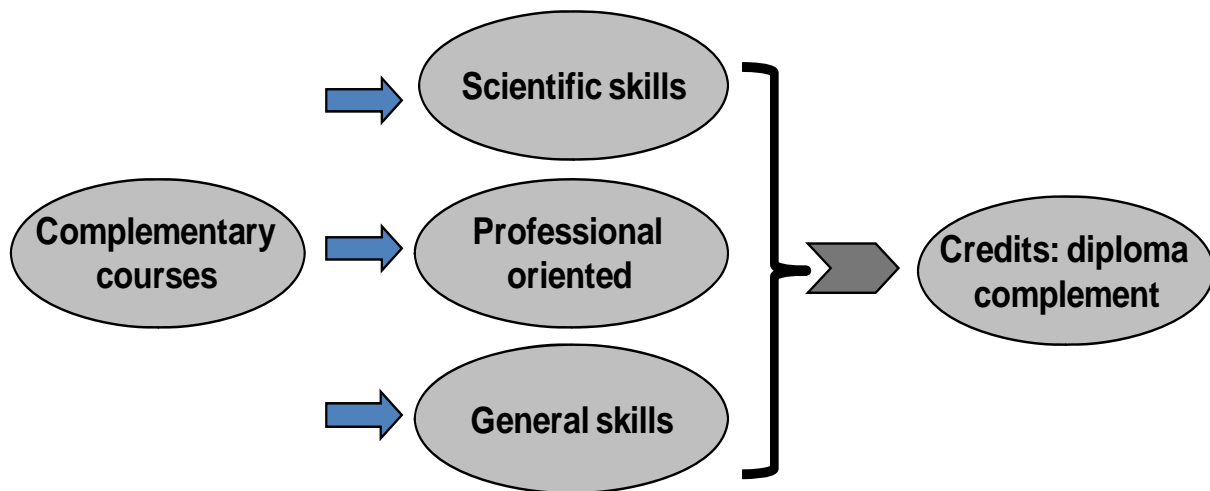


Figure 3. Categories of lectures required during the preparation of a doctorate: scientific deepening, general knowledge and professional approach of the economic world.

These categories are presented and justified in their own contexts.

6.2.3.1 Scientific lectures

This first category is mainly devoted to the improvement of the scientific level, the most adapted to the field of the doctoral dissertation. Let us note that in more and more cases, the subjects of the research works are multidisciplinary. This means that the doctoral student should increase his (her) knowledge in another field of his (her) initial background and become a specialist in a transverse research.

Various kinds of events may be organised for this purpose, such as keynotes, summer or winter schools, national, regional or local seminars and workshops of the doctoral students. These are some typical examples of high level lectures in the fields of EIE, selected from the websites of several doctoral schools (or post-graduation dept.):

- new approach of the reliability in micro and nanoelectronics,
- reliability and industrial maintenance,
- the new reconfigurable antennas,
- actives devices involved in the high power electronics,
- adaptive control and regulation,
- visual perception,
- electromagnetic compatibility,
- beyond Moore's law in microelectronics,
- new device concepts,
- innovating devices for ultimate integration on silicon.

In addition to the courses organized in the frame of the doctoral schools or in the frame of colleges of doctoral schools, some students are encouraged to attend other elective courses available in master programmes. In some cases, the student may get credits for that.

6.2.3.2 Generic-competence lectures (for soft skills)

The first goal in this case is the widening of the knowledge spectrum. Knowing that in EIE about fifty per cent of the doctoral students are recruited from abroad, many students will be eager to improve their practice of the language of the guest institute. For this purpose, the doctoral schools must manage with their home institution this international policy.

For EIE students not having English as the native language, improvement of the scientific English language practice is required, as well for the international conferences as for publications in international journals. Dedicated courses should be organized, and an average of more than 50% of doctoral students should attend these lectures.

Other more soft sciences, such as psychology, health and safety are also frequently proposed.

6.2.3.3 Professional lectures

This third category is much more devoted to the preparation of the economic and industrial world, including the intellectual properties, patents, project management, legal structures of companies, and human resources management. Indeed, if during the beginning of the 20th century almost all the doctors were initially devoted to academic positions; in the second half this behaviour turned out mainly for answering to the increasing need of innovation. In practice, more and more doctors are now attracted by research and development services of international companies or start-ups. Thus, some additional knowledge became more and more required. After a survey made in France on the job evolution in the companies involved in microelectronics, we deduce that all the human resource services (HRMs) demand some competencies in soft sciences, from human psychology, project managing to finance. Depending of the origin of the students, these competencies can be obtained in the frame of a master programme or in a “*Ecole d’Ingénieurs*”. However, many students have not this experience, unfortunately. Because they are not specific to a field and available for all the doctoral students, the lectures can be organized and shared by various Doctoral schools or post-graduation department. The following list gives some examples of lectures professionally oriented:

- founding a company,
- fund market and financing of companies,
- company strategy,
- innovation, creation, discovery,
- enterprise and environment,
- industrial property,
- economical intelligence, analyse of the value,
- project management,
- oral communication,
- management of human resources.

In this professional preparation a special attention must be paid to Academic position oriented complementary lectures. Even though the percentage of doctors reaching an academic position after obtaining the Doctorate is low, a large part of the students has at least this aim in mind. Specific lectures are organized including the pedagogic approaches and technics, oral expression, communications, and animations. This type of lecture can be considered as part of the professional oriented category.

For some years, these courses are offered in many doctoral schools or graduate schools in France, but also as stand-alone modules. These lectures aim at preparing the future doctor to the industrial environment.

6.2.3.4 Validation of the complementary lectures

All these lectures are usually validated by the doctoral school or the post-graduation department of the university. Depending on the institution and depending of the general field (human sciences, engineering sciences), hours or credits are attributed for these courses. The student will obtain the defence authorization by the director of doctoral school if the number of credits, clearly defined in categories at the beginning of the doctorate, is reached.

6.2.3.5 Diploma supplement

When the doctoral student fulfils the requirements concerning complementary education, a document is produced and signed by the director of the doctoral school that attests the work of the student; it gives the green light for the defence and is finally added to the diploma document.

Applying LLL to doctoral level needs a special attention on these complementary lectures usually organized all along the preparation of the doctoral studies. In practice, whatever the pathway, the final jury will have to check that the future doctor fulfils all the required conditions.

6.2.4 Management of the complementary education

If in the frame of Bologna process, the doctoral studies include now complementary education in the preparation of the doctorate, the diversity of requirements depends on countries and institutions. Several points are thus treated below.

6.2.4.1 Credits or equivalence

The approach can be a global equivalence of number of hours spent by the students, or, similarly to master credits, a global number of credits. In this case, when the student has spent for example five hours, one credit is delivered. It is now common to deliver 30 credits. This choice corresponds in fact to a semester at the bachelor or master level. However, the amount of worked hours is not really equivalent. If this number is increased, there will be a consequence on the research work that must remains intense and of a high quality; in other words, a good compromise must be found.

6.2.4.2 Classification of lectures and training

The second point is the division of the courses in categories: scientific, generic, professional. A classical approach consists to share the credits between the three categories, for instance, one third each. Another way consists in defining a minimum of credits (or hours) in each category, for example a quarter. This approach appears to be well adapted to students that have already built a carrier plan and that are able to manage their professional life.

6.2.4.3 Scheduling of the lectures

The third point concerns the scheduling of the courses during the Doctoral preparation. Many doctoral schools in the world prefer to start with these lectures and deliver at the end of the first semester or first year the authorization to pursue the Doctoral work by research activities in laboratories. If the approach warranties the success of the student on this compulsory part, it is not the best way to adapt the research and scientific approach as a function of the research progress. In addition, the need of general skills appears clearly after several months or even years of experiences. That is the reason of the new trend to propose a distribution among the two first years of the doctorate. Of course, this approach has consequences on the control of the student by the doctoral school secretary. That is also the reason why many doctoral schools are presently validating summer and winter schools, or tutorials organized in the frame of international conferences and workshops. They are usually well adapted to the research plan.

6.2.4.4 Attribution of credits and validation

The fourth point deals with the attribution of credits. If the credits correspond to a work, is it mandatory to have a qualitative evaluation of the work in terms of examinations? This point generates frequent discussions and controversy feeling. The students are usually considered in their first professional experience during the preparation of the doctorate; they have usually a salary or an equivalent grant. They are often employed by a company in the frame of a joint programme. Thus they are supposed to be mature enough to learn themselves and to conduct their professional life. However, what is the value of a lecture without examination? If a traditional exam does not seem to be the best approach, maybe a short report or a short discussion with the professor could be a good answer. The best example is the tutorial or keynote in an international event. The credit could be delivered by the supervisor on the base of a short report on the content of the attended lectures or seminars.

The next point concerns the validation or recognition of the credits in Europe. Thanks to the internationalisation of the research, and also thanks to many research European programmes, many doctoral students prepare a Doctorate in the frame of joint international supervising agreement between two institutions of two countries. If the agreement frequently includes the validation of credits, it is not presently a common rule. A European harmonization in this way could be interesting and time saving for establishing the content of the agreement document. A last but certainly not the least point is the connexion with life-long learning. It is clear that this aspect is more and more taken into account in the European Higher Education policy.

6.3 DEFINITION OF LLL for the doctoral level

This part deals with the evolution of the doctoral studies in the frame of LifeLong Learning in the field of EIE. The development in this field is somewhere atypical due to the type of research studies that are mainly performed. The main items are related to the following sub-disciplines:

- Electronics systems,
- Electronics devices,
- Microelectronics,
- Computer aided design,
- Optoelectronics,
- Microsystems,
- Instrumentations,
- Telecommunications,
- Power electronics,
- Power systems,
- Sensors and actuators,
- Computer automations,
- Signal processing,
- Image processing,
- Automatic control,
- Robotics,
- Computer engineering.

In all these fields, many research activities are linked to industrial development including in many cases agreements and partnership between companies and research laboratories. These research laboratories are in many cases a common research unit between several academic institutions and research bodies. Often doctoral students share their time between academic and industrial research units. In addition, as we will see in the results of a survey, the students can be financially supported by the different structures, sometimes employees of universities and/or of research bodies, sometimes employees of companies, and even sometimes part-time of the different institutions. This point leads to specific considerations of what could be the lifelong learning at the doctoral level in these fields. That is the reason to analyze in detail the different aspects and how it is possible to clarify the LLL procedures and highlight the related APL and APEL dedicated approaches.

6.3.1 Different pathways for preparing a Doctorate

As abovementioned, LLL at the Doctoral level allow several paths to obtain the doctorate. Figure 4 shows the four main paths that can be considered to get a doctorate through a LLL approach.

The first pathway corresponds to the regular situation of the majority of doctoral students. The students are selected among the best students of master degrees. Let us notice that they can be employed by the academic institution; in France for example, some of them are employed in the frame of a Doctoral contract, that corresponds to a work contract for the three years of the theoretical duration of the doctorate.

The second pathway is strictly the same as the previous one but the students are selected after the master degree diploma obtained in the frame of APCL. In the case of APL, the students don't possess the master degree, but they are enrolled at the university thanks to an equivalent level.

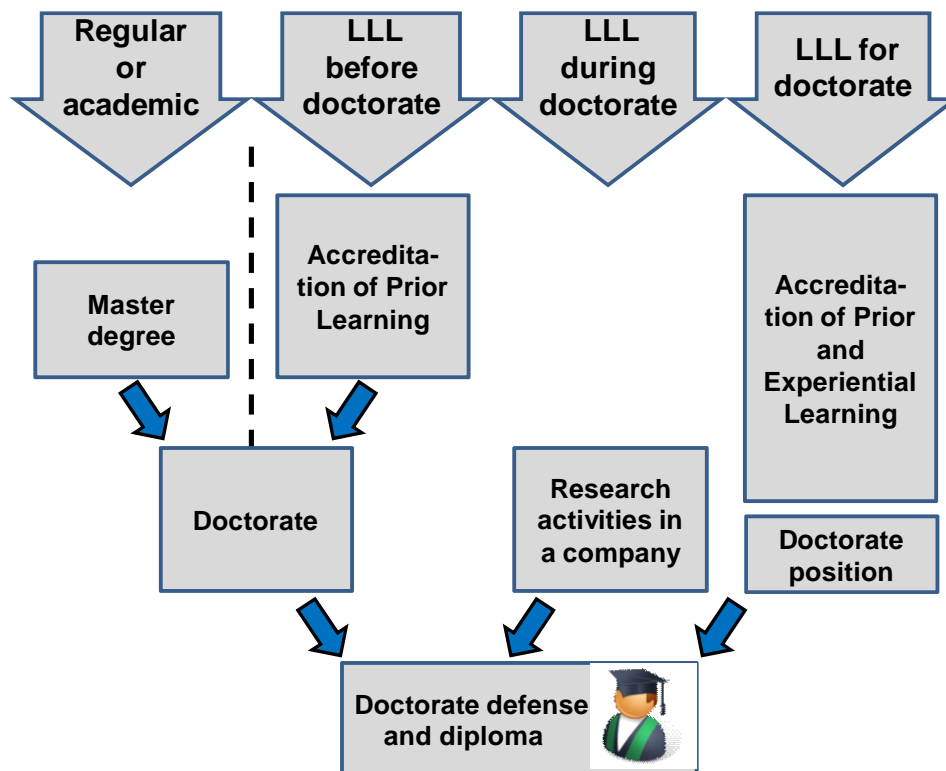


Figure 4. Several pathways involving LLL to obtain the Doctorate. The first pathway is classical. The three others are alternative possibilities, to answer to the lifelong learning considerations.

The third pathway is followed by students that are involved in a research work performed in both environments based on a partnership between a company and an academic laboratory. This is the most frequent situation in the field of EIE. The main reason is huge technological facilities required to perform some of the doctoral work, which is not always available in a classical university laboratory (microelectronics foundries, for example). In practice, with a serious partnership and a specific attention of the academic supervisors, the scientific work can be very close to the traditional doctoral research work. Because the student takes benefit of the industrial environment, the students can be considered in LLL position.

The fourth way consists in validating the professional and scientific experience, mainly in a company, in order to deliver the doctorate diploma. This approach is not easy; several problems could arise in comparison to the “standard” doctoral approach.

6.3.2 Specific consequences in the frame of APEL pathway

Three main aspects are pointed out in the frame of the APEL pathway (the fourth presented above).

6.3.2.1 Duration of the doctorate

The first problem emerges from the fact that doctorate duration in the EIE field ranges from three to four years depending on the national regulations. Even though the Bologna Declaration Communiqué strongly recommends a three-year duration in order to incite the doctors to enter early in the economical world (by preference at an age below 30) students commonly spend four years and sometimes more. However, rules on LLL agreed by the European Commission mention the possible validation via APEL (accreditation of prior and experiential learning) after only three years of professional activities. This could mean that from the legal point of view, after only three years, it could be possible to get a diploma in a shorter duration than in regular student position, this of course seems not serious from a scientific and academic point of view. If to obtain the master degree, this rule appears well adapted, the validation for a doctorate should be non realistic, because the usual professional position in the majority of the cases doesn't allow a fulltime activity devoted to research, such as regular student (except the mentioned previous case). That means that only after five to six years, the procedure can be launched; and an exception to the rule is therefore recommended. The new rules may be defined at the level of the academic institution that is expected to deliver the diploma of doctor. It is usually defined and adopted by the scientific council of the Institution.

6.3.2.2 Scientific quality of the previous research activities

The second point concerns the scientific quality of the previous research activities. A specific commission must be set-in to appreciate the resume of the candidate and mainly to evaluate the quality of the research production. For example, several papers in scientific and international journals or presentations in international conferences with published proceedings are required for a regular doctoral student before defence. In this case, the quality of research projects related to the concerned field and the production of patents can be taken into account.

6.3.2.3 Specific treatment for complementary lectures and credits

The third point concerns the credits that are obtained during the doctorate studies. As it was mentioned above, some additional lectures and complementary courses are organised during doctoral studies, aiming at preparing the student to the economic world. If this approach appears compulsory to students that have spent all their studies in an academic environment, the consideration is different for candidates that have already a long professional experience in the companies. The candidate in the frame of LLL (and APEL) may in this case benefit from at least a partial exemption. It is usually admitted that only some scientific higher level lectures or dedicated seminaries (winter schools, summer schools, etc.) must be attended by the student during the short period of doctorate student position.

This means a specific procedure to evaluate the professional experience of the candidate which can open the possibility to deliver the diploma, should be established.

6.4 QUESTIONNAIRE

6.4.1 Development of a questionnaire

As already mentioned, a way to have a good overview of the LLL applied at the doctoral level in Europe passes through a survey. The questionnaire was built by the members of task 4- Doctoral studies with the goal to survey the present situation and the main problems that could be solved at the level at each country or commonly. In practice, a first version was built at Palanga general meeting. After some presentation improvements, it was tested by several members of the work-task. At the task4 meeting in Malta, the team corrected some questions in order to be able to treat the results.

6.4.1.1 Structure of the questionnaire

The questionnaire should be built on the basis of three main parts,

- reason to make a survey,
- explanation on the glossary to be sure that all the answers are coherent,
- the questionnaire itself.

In addition, to encourage the colleagues to fill the questionnaire some information's are given on the pool of the contributors and on the exploitation of the results.

6.4.1.2 Purpose of the survey

The purpose was presented in the following way: "The objective of this questionnaire is to identify the existing LLL-systems in Europe within electrical engineering at the Doctoral level and identify and promote a European/international mobility of doctorate students and doctors issued from companies. Indeed, since 2002, recommendations of the European commission have been encouraging the LifeLong Learning at all the levels of High Education in Europe (B, M, D). Several countries have started a new approach in this way (see Bergen & London communiqué's). The interest of common approach at European level comes from the mobility of employees in multinational companies. The knowledge of the high education systems with their own rules or regulation should give the good paths for an application. One of the main deliverable is to give access to potential candidates the good and efficient advices to fulfil their project. Cross LLL in EIE is mandatory in agreement with the very fast evolution of this high technology field."

6.4.1.3 Main parts of the survey

With the mentioned goal, the seven parts of the questionnaire are the following:

- Part 1 Information about the target population
- Part 2 General information on LLL in your country
- Part 3 Admission process Doctoral students in LLL
- Part 4 Administrative situation of students in Doctoral position
- Part 5 In the frame of LLL, which of the following are mandatory
- Part 6 LLL Requirement for defence
- Part 7 Organization of defence

The global questionnaire sent to ELLEIEC partners is given in appendix C.

6.4.1.4 Compilation of the results

We tried to get an answer by country in connection with the partnership of the ELLEIEC network. However, the first problem comes from the fact that several partners are within Technical Universities that have not doctoral study activities, and these colleagues could not fill the questionnaire. In addition, some countries have not really started the application of LLL at the level of doctorate in their institutions. This is probably the reason why we got only 18 answers representing 16 countries, thus about 55% of European Higher Education Area (EHEA). These results are summarised in the following paragraph that includes the questionnaire and the answers. To make easier the reading we have added some graphs that highlight the main points.

6.4.2 Analysis of the survey: Aspects of LLL specific to the doctoral level

We give in the following, the results on the questionnaire by including several comments and some graphs to highlight the most interesting aspects.

Part 1: ELLEIEC partner answers

ELLEIEC Partner numbers: 02, 03, 05, 07, 13, 15, 17, 18, 21, 23, 25, 30, 32, 35, 36, 37, 38, 39, 43, 41, 42, 43, 44, 45 , 47, 48, 50, 52, 56. They represent a total number of 27 partners.

Countries represented in the answers: Bulgaria, Cyprus, Czech Rep., Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Romania, Slovakia, Spain, Turkey, United Kingdom which means that 21 countries are represented in this questionnaire. 19 answers will be available in the following synthesis.

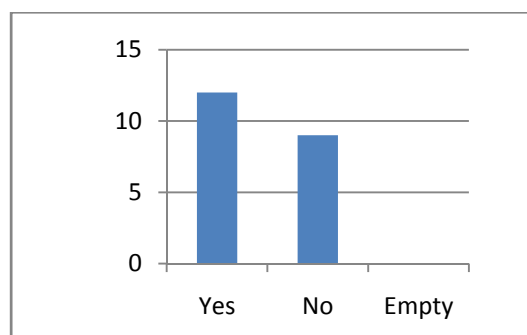
	PART 2				PART 3				PART 4							PART 5			PART 6		PART 7									
	Q1	Q2	Q3	Q4-1	Q4-2	Q0	Q1-1	Q1-2	Q2-1	Q2-2	Q1-1	Q1-2	Q2-1	Q2-2	Q2-3	Q2-4	Q2-5	Q2-6	Q2-7	Q1	Q2	Q3	Q1	Q1-1	Q1-2	Q1	Q2	Q3	Q4	
Bulgaria	Y	Y	Y	N	N	N	N	N			Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N				N	2	Y	Y	
Cyprus	N	N	N	N	N	Y	N	Y			Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y					1	N	Y	
Czech	Y	Y	Y	Y		Y	N	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	L	L	Y	0	Y	Y		
Estonia	Y	Y	Y	Y	Y	Y	N	N			Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N				N	2	N	Y	
France	Y	Y		Y	Y	N			Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y		Y	Y				N	2	Y	Y	
Germany	N	Y	N	N	N	N			N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N					N	M	Y	Y	
Greece	N	N	N	N	N	N			N	N	N	N	N	N	N	N	N	N	N	N	N	N								
Hungary	Y	Y	N	Y		Y	N	N			Y		Y					N	N	Y	Y	Y	N			N	M	Y	Y	
Ireland	N	N	N	Y	Y	Y	N				Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N				N	2	N	Y	
Italy	Y	Y	N	N	N	Y	N	N			Y	N	Y	N	N	N	N	Y	N	Y	N	Y	N				N			
Latvia	Y	Y		Y	N	Y	N	N			Y	Y	Y	Y		Y		N	N	N	N	N				N				
Lithuania	Y	Y	Y	Y	Y	Y	N	Y			Y	N	Y	N	N	N	N	Y	Y	Y	N	Y	N				N	M	Y	N
Malta	Y	Y	Y	Y	Y	N			Y	N	Y	Y	Y	Y		Y	Y	Y	Y	Y	N					N	M	Y	Y	
Norway	Y	Y	Y	Y	Y	Y	Y				Y			Y			Y	N	Y	Y	Y	Y	N			N	M	Y	Y	
Poland	N	Y	Y	Y	N	Y	N	Y			N	Y	N	N	N	Y	Y	N	Y	Y	N	N	N				N	2	Y	Y
Portugal	N	N	N	N	N	Y	N	N											Y	Y	Y	N					N	M	N	N
Romania	Y	Y	Y			Y	N	N			Y			Y			Y	Y	Y	N	Y	N				N	M	Y	Y	
Slovakia	Y	Y	Y	Y	N						Y	Y	Y	Y	N	N	N	N	N	Y	Y	Y	N				N	2	Y	Y
Spain	N	N	Y		N	Y					N	Y	Y				Y		Y		N					N	M	Y	Y	
Turkey	N	N	N	N	N	N					Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N				N	2	Y	Y	
United Kingdom	N	N	Y	N	N	Y	N	N	N	N	N	Y		Y			Y		N	N	N	N				Y	2	N	Y	

Table 1: Table presenting the set of data analysed in the following

Part 2 General information on LLL in your country

Do national regulations exist?

Yes	No	Empty
12	9	0



National rules: half have, half have not! The countries that have national rules recognized the APL but less APEL

Do you have any official governmental/ministerial policy on LLL?

Yes	No	Empty
14	7	0

A policy is mainly defined in all the countries, presently.

Are the policies of the universities or institutions defined?

Yes	No	Empty
11	8	2

A policy is mainly defined at the level of the institutions

In your country, does the LLL process include the following?

Accreditation of Prior Learning (APL)

Yes	No	Empty
11	8	2

Accreditation of Prior Experiential Learning (APEL)?

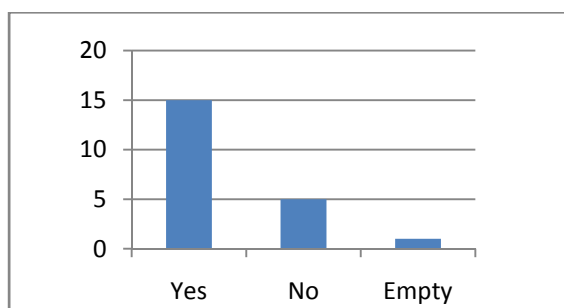
Yes	No	Empty
6	12	3

APEL is not yet applied in all the institutions.

Part 3 Admission process Doctoral students in LLL

Is a Diploma of master or equivalence of master mandatory?

Yes	No	Empty
15	5	1



The master is mainly mandatory, except Germany and Malta

If yes what other (if any) mandatory conditions apply?

Previous research experience

Yes	No	Empty
0	13	2

Previous research experience is not mandatory if the master is mandatory. Because the majority of masters include research activities in Europe, this means a mandatory research experience before in all cases.

Specific lectures defined by the host institution

Yes	No	Empty
5	8	2

Only 5 countries require specific lectures

If no what other mandatory condition will suffice (check each that applies)?

Previous research experience

Yes	No	Empty
2	3	0

Specific lectures defined by the host institution

Yes	No	Empty
1	4	0

Part 4 Administrative situation of students in Doctoral position

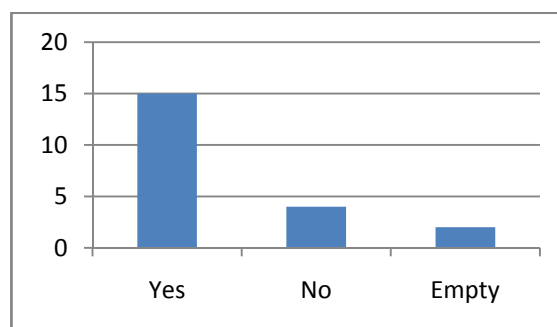
Is LLL Doctorate study in your institution in full-time and/or part-time form?

Full-time

Yes	No	Empty
15	4	2

Part-time

Yes	No	Empty
13	3	5



LLL students are mainly considered as full-time or part-time students.

How are the LLL Doctoral students considered (tick all relevant answers)?

	Yes	No	Empty
Student only	14	3	4
Employees of the University	12	5	4
Both employees (University/Company)	7	6	8
Employees of research bodies	10	4	7
Employees of a company	11	3	7
Do you accept LLL students without any financial support, *?	12	7	2
Existence of international joint degree, co-supervisor	11	6	4

From that table, we can observe that an applicant may be indifferently student or employee of both.

The students may be accepted without financial support, in most countries.

It is possible for a majority to be in a joint program at the doctoral level.

Part 5 In the frame of LLL, which of the following are mandatory

Competence related credits?

Yes	No	Empty
12	7	2

Competence related credits is mandatory in 12 cases among 25.

Professional tutorial attendance?

Yes	No	Empty
8	10	3

High level scientific lectures attendance?

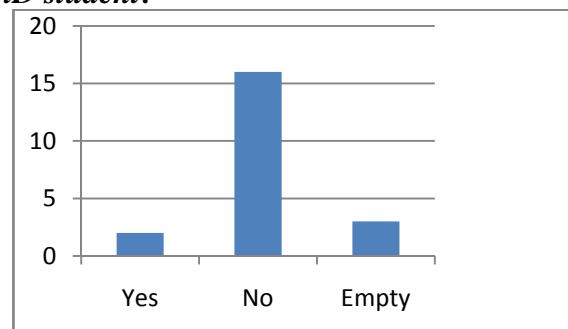
Yes	No	Empty
12	7	2

High level scientific lectures are generally preferred to professional tutorials.

Part 6 LLL Requirement for defence

Is there a difference between LLL and regular PhD student?

Yes	No	Empty
2	16	3



In all cases, the requirements for defence are similar for LLL than for regular doctoral students, and the organizations of defence are also the same. An exception is the case of the Czech Republic, requiring no defense.

If yes:

Difference in number of publications in journals listed in ISI (accepted or published)?

LLL applicant must publish?

Less	equal	more
1		

Difference in number of presentations of papers at international conferences with proceedings?

LLL applicant must present?

Less	Equal	more
1		

Since there are generally no differences between classical and “LLL-oriented” Doctoral studies, except in 2 cases, there are generally no difference concerning papers and conferences.

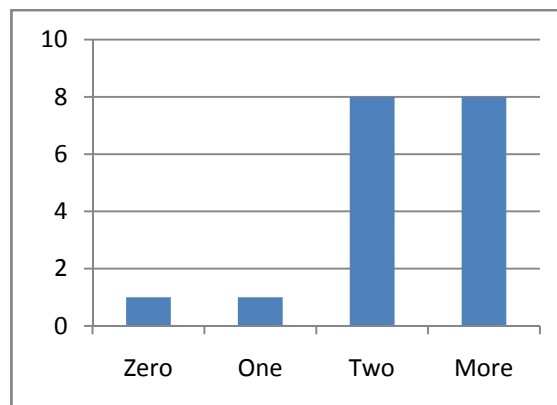
Part 7 Organization of defence

Is there a difference between LLL and regular doctoral student?

Yes	No	Empty
2	17	2

How many reviewers are required for LLL student?

Zero	One	Two	More	Empty
1	1	8	8	12



How many reviewers are required for LLL student?

The same as for a standard doctoral jury.

Requirement for the selection of the reviewers for LLL student

Is there existence of a review report before defence?

Yes	No	Empty
13	5	3

Is there existence of a jury report after the defence?

Yes	No	Empty
16	2	3

Reports before and after defence are requested in the wide majority of cases.

6.4.3 Synthesis of the results

The scientific quality of the Doctorate remains a permanent keypoint and the main goal for all the institutions in Europe. During the preparation of the questionnaire and brainstorming between the European partners of this network, the first major information that arose is the different interpretation of LLL at the doctoral level. For many institutions in Europe in the field of Electrical and information Engineering, the doctorate position corresponds to a first professional experience or job and thus the diploma is considered as delivered in a LifeLong Learning frame. Of course, the APEL becomes another point to consider, and the main objective of the questionnaire was to detect if APEL is already available.

Even though the definition of LLL can be a little bit different, including or not the APEL, the final procedures are all oriented with the same goal, the scientific quality of the results and thus the recognition of the PhD whatever the approach.

We have detected no significant difference for LLL at the level of the selection of students, the scientific production, the organization of the defence, and the attribution of the diploma.

Only some differences about the procedures and the national organizations were revealed.

Figure 5 shows a dendrogram built on the correlation between the answers for the countries represented in the PhD LLL survey. This clustering analysis of the PhD questionnaire is based on hierarchical regrouping using Euclidean metrics with the algorithm Ward linkage. In other words, the difference of information, in our case the answers to the questionnaire, increases on the vertical axis. We may observe three main groups of countries for which the number of differences is lower than 10. This means that they have more or less the same rules and procedures for delivering the Doctorate in the frame of LLL.

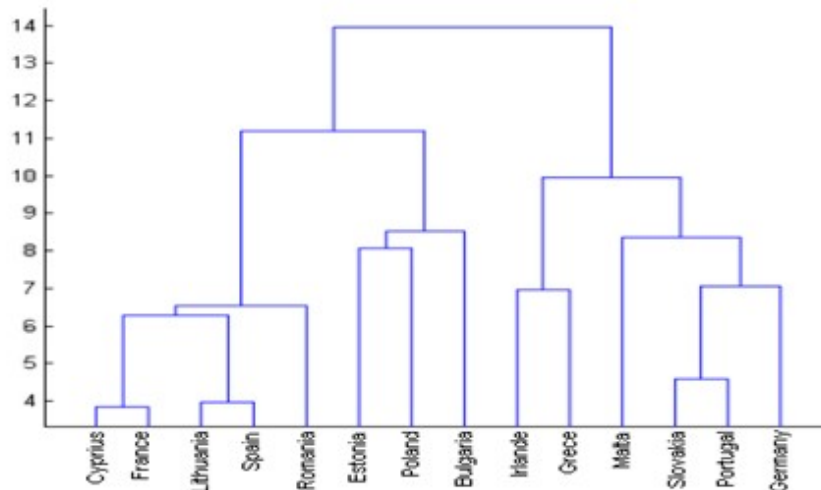


Figure 5: This dendrogram is built on the correlation between the answers for the countries represented in the survey. The difference of information increases on the vertical axis. We may observe three main groups of countries that have more or less the same rules and procedures for delivering the Doctorate within the frame of LLL.

Several institutions in Europe have not yet started the process of LLL recognition in the frame of APEL. The present analysis could be a base to set-up the LLL at the doctoral level in these countries, taking account of the best practices existing throughout the European Union.

6.5 Recommendations

Following the discussions and diversity of comments of the working group on doctoral studies and LLL, some recommendations can be proposed to the Electrical Engineering community:

- i. All the partners agree with the need to take care of the scientific quality of the research whatever the path. The good behaviour of the partners must be followed in all the new procedures.
- ii. The organization of the defense with some specific local requirements is built to get the same diploma that can be recognized everywhere in Europe and elsewhere. At the end, there should be no difference, the diploma is unique. However, the choice of two reviewers for each defense should be a good way to have comparable evaluations.
- iii. Even if the institutions in Europe are more and more free about their own organization and on the delivery of their diplomas, the Bologna process and the related recommendations via several Communiqués [2, 50] must be considered. The attributed freedom must also ensure a high quality of the diploma.
- iv. During the preparation of Doctorate, almost all the institutions propose to organize some additional courses that are mainly oriented to an improvement of the scientific skills and competences of the future doctors. These courses include summer schools, winter schools, and high level seminars, in very specialized fields. These courses may lead to the delivery of credits that can be available for all the European Institutions.

They are not real ECTS because in many countries there are no credits required to deliver the diploma but they can appear in the diploma supplement, a paper that is validated by the graduate school or doctoral school and the scholarship office of the institution where the student is enrolled. Maybe a European harmonization could consist to create a credit reference for all the PhD.

- v. In each European Institution that have not started a LLL procedure, a first reflection can be launched about the definition of LLL and the opportunity to include the APEL procedure at the doctoral level. This later can be a way to increase the number of doctors who have mainly a prior and an experiential learning.
- vi. The European institutions if possible with the support of the European Commission should continue to organize at least annually, some seminars of reflection on the policy about doctoral preparation in order to adapt the procedure with the very fast evolution of the environment. ELLEIEC network has enough experience to confirm this general interest. EAEEIE European association [29] can play the role of European reference in this domain. A European financial support to the EAEEIE association allowing a continuation of ELLEIEC network should be a good way to perpetuate the efforts.

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8. APPENDIX A: QUESTIONNAIRE FOR BACHELOR AND MASTER LEVELS

8.1 Original questionnaire

Enhancing Lifelong Learning for the Electrical and Information Engineering Community **Questionnaire-Identifying existing Lifelong Learning Systems** **Introduction**

Glossary

LLL & LLP (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:327:0045:0068:EN:PDF>)

The general objective of the Lifelong Learning Programme is to contribute through lifelong learning to the development of the Community (EU) as an advanced knowledge-based society, with sustainable economic development, more and better jobs and greater social cohesion, while ensuring good protection of the environment for future generations. In particular, it aims to foster interchange, cooperation and mobility between education and training systems within the Community so that they become a world quality reference.

APL (<http://resources.glos.ac.uk/apply/apl/index.cfm>)

Accreditation of prior learning (APL) is an opportunity for student to be given credit for learning that student has done before started at the University, or for learning that student is currently doing outside of the University. It avoids the necessity of duplicating previous learning, whilst ensuring a system to demonstrate successful attainment of the learning outcomes appropriate to student's award.

Prior learning may be experiential or certificated: Certificated Learning (**APCL**) is learning for which student will have received a formal qualification, for example a Certificate or Diploma, or individual modules/course units completed at another institution.

APEL (<http://dictionary.bnet.com/definition/Lifelong+Learning.html?tag=coll:rbDictionary>)

Accreditation Of Prior And Experiential Learning (APEL) is a process that enables people of all ages, backgrounds and attitudes to receive formal recognition for skills and knowledge they already possess. A person's learning and experience can be formally recognised and taken into account to:

- gain entry to further or higher education courses
- give exemption from certain parts of a new course of study
- qualify for an award in an appropriate subject in further or higher education

ECVET: (<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0180:FIN:EN:PDF>)

Purpose of survey

The objective of this questionnaire is to identify the existing LLL-systems in Europe within Electrical engineering at Bachelor and Master levels. The secondary objective is to give an input to the questionnaire on Ph.D. level and identify and promote increase of European/international mobility.

Results of survey

The results of this questionnaire will be used to analyze the recognition systems needed to ensure the credit transfer within LLL-systems, internationally. This work will help to develop attractiveness for mobility and improve cooperation between countries and universities. All outcomes will be available on www.elleiec.eu

Target population (primary, secondary):

- ELLEIEC-partners, one per country
- All European countries have to be represented, if some are missing (not active partners) then one representative per country have to be appointed,
- staff

Part 1.

ELLEIEC Partner number :	
If not please fill up the following lines:	
country:	
City:	
Your e-mail:	
Your position:	
University name:	
Optional Name:	

Tools for LLL at European level:

Do you know what ECTS is?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Are you using ECTS in your own university for grading?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Are you using ECTS in your own university for international exchanges?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Who is in charge to design the learning agreement related to ECTS?			
	Inter. Dept?	Scholar Dept?	Teacher?
Do you know what a Diploma Supplement (DS) is?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Are you using the DS in your own university?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Who is in charge to design the DS?			
	Inter. Dept?	Scholar Dept?	Teacher?
Do you know what ECVET is?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Are you using ECVET in your own university?		<input type="checkbox"/> yes	<input type="checkbox"/> no
Who is in charge to record a prior learning with ECVET?			
	Inter. Dept?	Scholar Dept?	Teacher?
What kind of grant your university provide for an ongoing student :			
European one		<input type="checkbox"/> yes	<input type="checkbox"/> no
National one		<input type="checkbox"/> yes	<input type="checkbox"/> no
Regional one		<input type="checkbox"/> yes	<input type="checkbox"/> no
self University funding		<input type="checkbox"/> yes	<input type="checkbox"/> no
What kind of grant your university provide for an incoming student :			
European one		<input type="checkbox"/> yes	<input type="checkbox"/> no
National one		<input type="checkbox"/> yes	<input type="checkbox"/> no
Regional one		<input type="checkbox"/> yes	<input type="checkbox"/> no
self University funding		<input type="checkbox"/> yes	<input type="checkbox"/> no

Part 2.

General information on LLL in your country			
1.	Do you have any official governmental/ministerial policy on LLL	<input type="checkbox"/> yes	<input type="checkbox"/> no
	If yes, indicate the name of the program and link to the web-site below:		
2.	In your country, does the LLL process include one of the following:		
	Accreditation of Prior Learning (APL)	<input type="checkbox"/> yes	<input type="checkbox"/> no
	Accreditation of Prior Experiential Learning (APEL)	<input type="checkbox"/> yes	<input type="checkbox"/> no

	Other (specify):	
--	------------------	--

Types of programmes/courses for which officially recognized LLL credits are awarded in your country		
(recognition means "It gives credits (ECTS) to go to the next level or to obtain the final diploma"):		
Regular University Programs	<input type="checkbox"/> yes	<input type="checkbox"/> no
recognized by university or other authority:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Bachelor	<input type="checkbox"/> yes	<input type="checkbox"/> no
Master	<input type="checkbox"/> yes	<input type="checkbox"/> no
Single courses/modules	<input type="checkbox"/> yes	<input type="checkbox"/> no
recognized by university or other authority:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Vocational training	<input type="checkbox"/> yes	<input type="checkbox"/> no
recognized by university or other authority:	<input type="checkbox"/> yes	<input type="checkbox"/> no
Comments:		

Admission possibilities for students with foreign based APL/APEL?		<input type="checkbox"/> yes	<input type="checkbox"/> no
If yes, specify and write link to the web-site:			

Where compulsory internship is part of a programme, is it possible to get credit for previous practical work/experience?	<input type="checkbox"/> yes	<input type="checkbox"/> no
--	---------------------------------	--------------------------------

8.2 Additional Questions

ELLEIEC Partner number :			
If not please fill up the following lines:			
country:			
2.	In your country, does the LLL process include one of the following:		
	Accreditation of Prior Learning (APL)	<input type="checkbox"/> yes	<input type="checkbox"/> no
	Accreditation of Prior Experiential Learning (APEL)	<input type="checkbox"/> yes	<input type="checkbox"/> no
3	at your university, do you have an office in charge of APL	<input type="checkbox"/> yes	<input type="checkbox"/> no
	at your university, do you use APL in order to allow student's admission for regular programme	<input type="checkbox"/> yes	<input type="checkbox"/> no
	at your university, do you use APL to allow a partial validation of the programme	<input type="checkbox"/> yes	<input type="checkbox"/> no
	at your university, do you use APL to allow validation of the complete programme (giving diploma)	<input type="checkbox"/> yes	<input type="checkbox"/> no
	Other (specify):		
4	Do you have a national body in charge to define the job profile references (References which has to be used in a national diploma accreditation process)	<input type="checkbox"/> yes	<input type="checkbox"/> no
	Please if a website exist, specify the link given the job nomenclature reference in EIE field		

9. APPENDIX B: TABLE WITH THE RESULTS OF THE SURVEY AT THE BACHELOR AND MASTER LEVELS

Statistics of the Bachelor and Master questionnaire

Part 1	Yes	No	% of Yes	% of No
Do you know what ECTS is?	37	0	100,00	0,00
Are you using ECTS in your own university for grading?	29	8	78,38	21,62
Are you using ECTS in your own university for international exchanges?	35	2	94,59	5,41
Who is in charge to design the learning agreement related to ECTS?				
Do you know what a Diploma Supplement (DS) is?	36	1	97,30	2,70
Are you using the DS in your own university?	29	7	78,38	18,92
Who is in charge to design the DS?				
Do you know what ECVET is?	29	5	78,38	13,51
Are you using ECVET in your own university?	27	5	72,97	13,51
Who is in charge to record a prior learning with ECVET?				
What kind of grant your university provide for an ongoing student :				
European one	32	1	86,49	2,70
National one	30	1	81,08	2,70
Regional one	22	3	59,46	8,11
self University funding	26	0	70,27	0,00
What kind of grant your university provide for an incoming student :				
European one	32	1	86,49	
National one	26		70,27	
Regional one	21		56,76	
self University funding	24		64,86	

Part 2	Yes	No	% of Yes	% of No
Do you have any official governmental/ministerial policy on LLL	23	14	62,16	37,84
If yes, indicate the name of the program and link to the web-site below				
In your country, does the LLL process include one of the following:				
Accreditation of Prior Learning (APL)	21	13	56,76	35,14
Accreditation of Prior Experiential Learning (APEL)	13	19	35,14	51,35
Other (specify):				
Types of programmes/courses for which officially recognized LLL credits are awarded in your country:				
Regular University Programs	26	6	70,27	16,22
recognized by university or other authority	20	8	54,05	21,62
Bachelor	23	8	62,16	21,62
Master	25	8	67,57	21,62
Single courses/modules	25	6	67,57	16,22
recognized by university or other authority	23	8	62,16	21,62
Vocational training	15	14	40,54	37,84
recognized by university or other authority	14	14	37,84	37,84
Comments				
Admission possibilities for students with foreign based APL/APEL?	16	15	43,24	40,54
If yes, specify and write link to the web-site:				
Where compulsory internship is part of a programme, is it possible to get credit for previous practical work/experience?	18	13	48,65	35,14

<i>Additional Questions</i>	<i>Yes</i>	<i>No</i>	<i>% Yes</i>	<i>% No</i>
In your country, does the LLL process include one of the following:				
Accreditation of Prior Learning (APL)	17	6	74%	26%
Accreditation of Prior Experiential Learning (APEL)	14	9	61%	39%
at your university, do you have an office in charge of APL	9	14	39%	61%
at your university, do you use APL in order to allow student's admission for regular programme	14	9	61%	39%
at your university, do you use APL to allow a partial validation of the programme	18	5	78%	22%
at your university, do you use APL to allow validation of the complete programme (giving diploma)	2	21	9%	91%
Other (specify):				
Do you have a national body in charge to define the job profile references (References which has to be used in a national diploma accreditation process)	10	12	43%	52%
Please if a website exist, specify the link given the job nomenclature reference in EIE field				

10. APPENDIX C: QUESTIONNAIRE ON THE EXISTING WAYS TO MEASURE COMPETENCES AT THE DOCTORAL LEVELS

Enhancing Lifelong Learning for the Electrical and Information Engineering Community

Questionnaire-Identifying existing LifeLong Learning Systems

Introduction

Purpose of survey

The objective of this questionnaire is to identify the existing LLL-systems in Europe within electrical engineering at PhD level and identify and promote a European/international mobility of doctorate students and doctors issued from companies. Indeed, since 2002, recommendations of the European commission have been encouraging the LifeLong Learning at all the levels of High Education in Europe (B, M, D). Several countries have started a new approach in this way (see Bergen & London communiqué's). The different paths are given in the following glossary. The interest of common approach at European level comes from the mobility of employees in multinational companies. The knowledge of the high education systems with their own rules or regulation should give the good paths for an application. One of the main deliverable is to give access to potential candidates the good and efficient advices to fulfill their project. Cross LLL in EIE is mandatory in agreement with the very fast evolution of this high technology field.

Glossary

LLL & LLP (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:327:0045:0068:EN:PDF>)

The general objective of the Lifelong Learning Programme is to contribute through lifelong learning to the development of the Community (EU) as an advanced knowledge-based society, with sustainable economic development, more and better jobs and greater social cohesion, while ensuring good protection of the environment for future generations. In particular, it aims to foster interchange, cooperation and mobility between education and training systems within the Community so that they become a world quality reference.

APL (<http://resources.glos.ac.uk/apply/apl/index.cfm>)

Accreditation of prior learning (APL) is an opportunity for student to be given credit for learning that student has done before started at the University, or for learning that student is currently doing outside of the University. It avoids the necessity of duplicating previous learning, whilst ensuring a system to demonstrate successful attainment of the learning outcomes appropriate to student's award.

Prior learning may be experiential or certificated: **Certificated Learning (APCL)** is learning for which student will have received a formal qualification, for example a Certificate or Diploma, or individual modules/course units completed at another institution.

APEL (<http://dictionary.bnet.com/definition/Lifelong+Learning.html?tag=col1:rbDictionary>)

Accreditation Of Prior And Experiential Learning (APEL) is a process that enables people of all ages, backgrounds and attitudes to receive formal recognition for skills and knowledge they already possess. A person's learning and experience can be formally recognised and taken into account to:

- gain entry to further or higher education courses,
- give exemption from certain parts of a new course of study,
- qualify for an award in an appropriate subject in further or higher education.

Aspects of LLL specific to the PhD level

The possibility of European employees to reach the PhD level from master degree by the way of LLL is opened by both ways:

- entering the PhD via APL. In this case, the PhD student is included in the regular doctorate studies after APL procedure. Then, they prepare the doctorate similarly to the other PhD students,
- passing the PhD through an APEL process. The preparation of the doctorate is thus specific.

The aim of this survey consists in detecting and analysing the different possibilities offered to candidates.

Results of survey

The results of this questionnaire will be used to analyze the recognition systems needed for obtaining a PhD, in Europe. This work will help the candidates to upgrade their master degree to doctorate, mainly in the frame of LongLife Learning. A database will be built for this purpose in the field of electrical and information engineering.

The final goal consists in giving access to this database to the European EIE community, and more specifically to the contributors of this survey.

Pool of contributors:

- ELLEIC-partners, one per country. All European countries should be represented
- Deans, directors of doctoral or graduate studies in institutions allowed to deliver PhD

Questionnaire

Part 1 Information about the target population

ELLEIEC partner number (if any): P_.....

Your country:

Optional information:

Name:

Your position:

Your e-mail:

Country:

University name:

University address:

.....

.....

Part 2 General information on LLL in your country

1. **Do national regulations exist?** Yes No

2. **Do you have any official governmental/ministerial policy on LLL** Yes No

If yes, the name of the program and link to the web-site:

3. **Are the policies of the universities or institutions defined?** Yes No

If yes, the name of the program and link to the web-site:

4. **In your country, does the LLL process include the following:**

Accreditation of Prior Learning (APL) Yes No

Accreditation of Prior Experiential Learning (APEL) Yes No

Other (specify):

Part 3 Admission process Doctoral students in LLL

Is a Diploma of master or equivalence of master mandatory? Yes No

1. **If yes what other (if any) mandatory conditions apply**

Previous research experience Yes No

Specific lectures defined by the host institution Yes No

Others

2. If no what other mandatory condition will suffice (check each that applies)

- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| Previous research experience | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Specific lectures defined by the host institution | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Others | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

Part 4 Administrative situation of students in Doctoral position

1. Is LLL Doctorate study in your institution in full-time and/or part-time form

- | | | | | |
|-----------|--------------------------|-----|--------------------------|----|
| Full-time | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Part-time | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

Comments:

2. How are the LLL Doctoral students considered (tick all relevant answers)?

- | | | | | |
|--|--------------------------|-----|--------------------------|----|
| Student only | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Employees of the University | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Both employees (University/Company) | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Employees of research bodies | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Employees of a company | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Do you accept LLL students without any financial support, *? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Existence of international joint degree, co-supervisor | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

* This question relates to institutions that impose a financial support requirement on regular Doctoral students (scholarship, grant dedicated to the thesis, industrial contracts)

Comments:

Part 5 In the frame of LLL, which of the following are mandatory

- | | | | | |
|---|--------------------------|-----|--------------------------|----|
| 1. Competence related credits | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Professional tutorial attendance | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. High level scientific lectures attendance | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

Comments:

Part 6 LLL Requirement for defense

Is there a difference between LLL and regular PhD student? Yes No

If yes:

1. Difference in number of publications in journals listed in ISI (accepted or published)

LLL applicant must publish less equal more

2. Difference in number of presentations of papers at international conferences with proceedings

LLL applicant must present less equal more

3. Other differences (please specify)

.....
.....

Part 7 Organization of defense:

Is there a difference between LLL and regular PhD student? Yes No

How many reviewers are required for LLL student? 1 2 More

Requirement for the selection of the reviewers for LLL student:

Existence of a review report before defense Yes No

Existence of a jury report after the defense Yes No

The following report has been made under the responsibility of the ELLEIEC consortium (60 partners) and it is a part of the deliverable outcomes of the ELLEIEC TN.

11. APPENDIX D: CURRENT SITUATION RELATIVE TO LIFELONG LEARNING IN EUROPE

**Current situation relative to lifelong learning in Europe.
Data taken from the official Bologna Process website, July 2007 - June 2010.**

Source:

<http://www.ond.vlaanderen.be/hogeronderwijs/bologna/actionlines/stocktaking.htm>

This website contains the stocktaking report on the Bologna Process presented at the meeting of ministers of education in Louvain-la-Neuve Belgium, April 2009, and the national reports.

The national reports include a series of detailed questions. The countries provide data about their progress on the Bologna action lines. The countries also describe the processes initiated at national level to support implementation of the Bologna reforms.

The total number of reports is 48: there are 46 countries in the Bologna Process, with two reports each for Belgium and the United Kingdom.

In part I, there are 22 questions. We looked at the questions 16 (Recognition of prior learning) and 17 (Flexible learning paths) for the following countries:

Austria
Belgium/Flemish Community, Belgium/French Community
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Lithuania

Luxembourg
Malta
Netherlands
Norway
Poland
Portugal
Romania
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
UK/England, Wales, N. Ireland
UK/Scotland

Recognition of prior learning (RPL)

Questions on Recognition of prior learning

- a) Do you have nationally established procedures in place to assess RPL as a basis for access to HE programmes?
- b) Do you have nationally established RPL procedures in place to allocate credits towards a qualification?
- c) Do you have nationally established RPL procedures in place to allocate credits for exemption from some programme requirements?
- d) To what extent are any such procedures applied in practice?

We allocated the following weights:

Questions a,b and c:

Yes=1 No=0

Question d has 4 possible answers:

Comprehensively=1 Some=0,66 A little=0,33 None=0

Comments in the stocktaking report:

While a small number of countries have quite advanced systems for the recognition of prior learning (RPL), the answers from many other countries suggest there is little or no recognition of learning undertaken outside the formal education system. There has not been much progress since 2007.

In some countries RPL appears to be included in national policy but it does not seem to be applied in practice; in other countries it happens in practice without any national

procedures or guidelines being in place. Even where RPL systems exist, individuals are often insufficiently aware of the possibilities to have their previous learning assessed and recognised.

Some countries are using RPL to encourage more adults into higher education, thus improving the social dimension of higher education and promoting the inclusion of previously under-represented groups and improving the skill levels of the workforce. In some countries, the practice of RPL appears to be better developed in the non-university HE sector, although formal partnerships and linkages for RPL do exist between universities and others types of HEI in some parts of the EHEA . In a few cases, additional measures are being taken to increase access to HE by facilitating RPL for specific target groups.

It will not be possible to overcome the demographic and economic challenges through lifelong learning until RPL is systematically implemented in all countries. This requires firstly a change of culture in HEI s and secondly that credits are linked with learning outcomes, with appropriate methods developed to assess the full range of learning outcomes.

Flexible learning paths

Questions on Flexible learning paths

- a) Are there specific measures in place to promote flexible learning paths within the national qualifications framework?
- b) Are there any measures to support HE staff in establishing flexible learning paths?
- c) Is there flexibility in entry requirements aimed at widening participation?
- d) Are there any flexible delivery methods to meet the needs of diverse groups of learners
- e) Are there modular structures of programmes to facilitate greater participation?
- f) If possible, please provide any statistics on the results of measures taken to create opportunities for flexible learning paths in higher education, to encourage participation by under-represented groups,

We allocated the following weights:

Questions a,b,c,d and e:

Yes=1 No=0

Question f asks for an open answer.

Comments in the stocktaking report:

Few countries have made an explicit link between flexible learning and their national qualifications frameworks, and this is an obstacle that prevents people who are already in the labour market from becoming involved in education. In addition, very few countries keep statistical data about the results of measures to increase participation by under-represented groups in flexible learning paths.

In the following table, the scores on the questions are put together.

The logo for ELLEiEC features the word 'ELLEiEC' in a blue, sans-serif font. The 'L's are stylized to resemble open books, and the 'i' has a small grey circle above it.

Education and Culture DG

Lifelong Learning Programme

The logo for the Education, Audiovisual and Culture Executive Agency (EACEA), with 'EACEA' in large blue letters and the full name below it.

We added the scores for each country. A high total means that LLL has a high degree of implementation.

The best practice is in Flanders and France.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	SUM
Belgium/Flemish Community	1	1	1	1	1	1	1	1	1	9
France	1	1	1	1	1	1	1	1	1	9
Ireland	1	1	1	0,66	1	1	1	1	1	8,66
UK/Scotland	1	1	1	0,66	1	1	1	1	1	8,66
Luxembourg	1	1	1	1	0	1	1	1	1	8
Norway	1	0	1	1	1	1	1	1	1	8
Finland	1	1	1	0,66	0	1	1	1	1	7,66
Sweden	1	1	1	0,66	1	0	1	1	1	7,66
Iceland	1	1	1	0,33	1	0	1	1	1	7,33
Bulgaria	1	0	1	1	1	0	1	1	1	7
Denmark	1	1	1	0,66	1	0	0	1	1	6,66
Italy	0	1	1	0,66	1	0	1	1	1	6,66
Spain	1	0	1	0,66		1	1	1	1	6,66
UK/England, Wales, N. Ireland	1		0	0,66	1	1	1	1	1	6,66
Belgium/French Community	1	0	1	1	0	0	1	1	1	6
Netherlands	1	0	0	1	1	1		1	1	6
Romania	1	1	0	0	1	1	0	1	1	6
Czech Republic	0	0	0	0,66	1	1	1	1	1	5,66
Germany	1	0	1	0,66		0	1	1	1	5,66
Serbia	0	1	1	0,66	1	0	1	1	0	5,66
Croatia	0	1	0	0,33	0	1	1	1	1	5,33
Estonia	0	1	0	0,33	1	1	0	1	1	5,33
Latvia	0	0	1	0,33	0	1	1	1	1	5,33
Slovenia	1	1	1	0,33		0	1	1	0	5,33
Portugal	1	1	1	1	0	0	1	0	0	5
Hungary	1	0	1	0,66	0	0	1	1	0	4,66
Malta	0	0	0	0,66	1	0	1	1	1	4,66
Greece		1			1	1	1			4
Lithuania	1	0	0	0	0	1	1	1	0	4
Switzerland	0	0	0	0,66	0	0	1	1	1	3,66
Austria	0	0	0	0,33	0	0	1	1	1	3,33
Cyprus	0	0	0	0	0	1	0	1	1	3
Turkey	0	0	0	0	0	1	1	1	0	3
Slovakia	0	0	0	0	0	0	0	1	0	1
Poland	0	0	0	0,66						0,66